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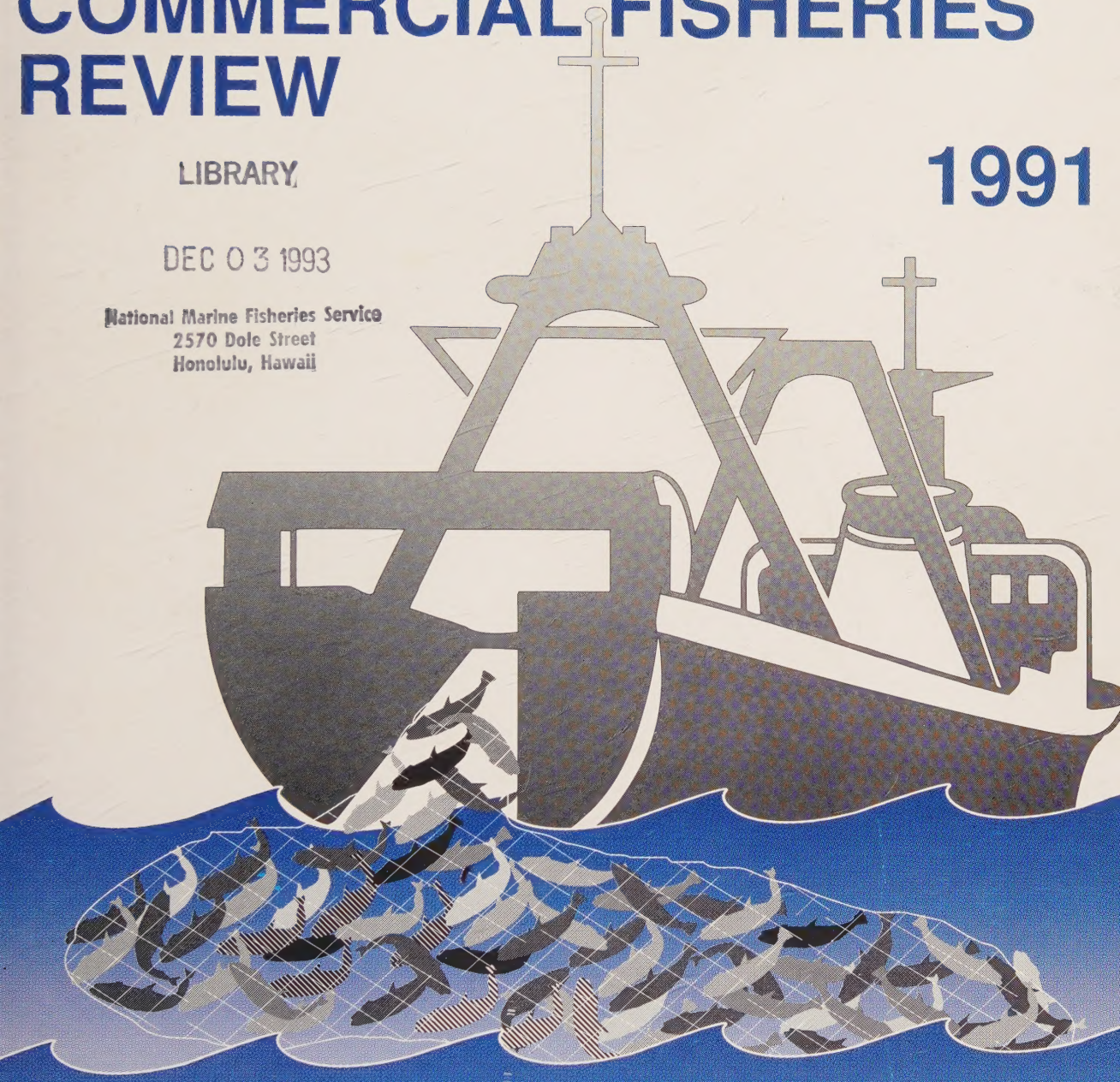

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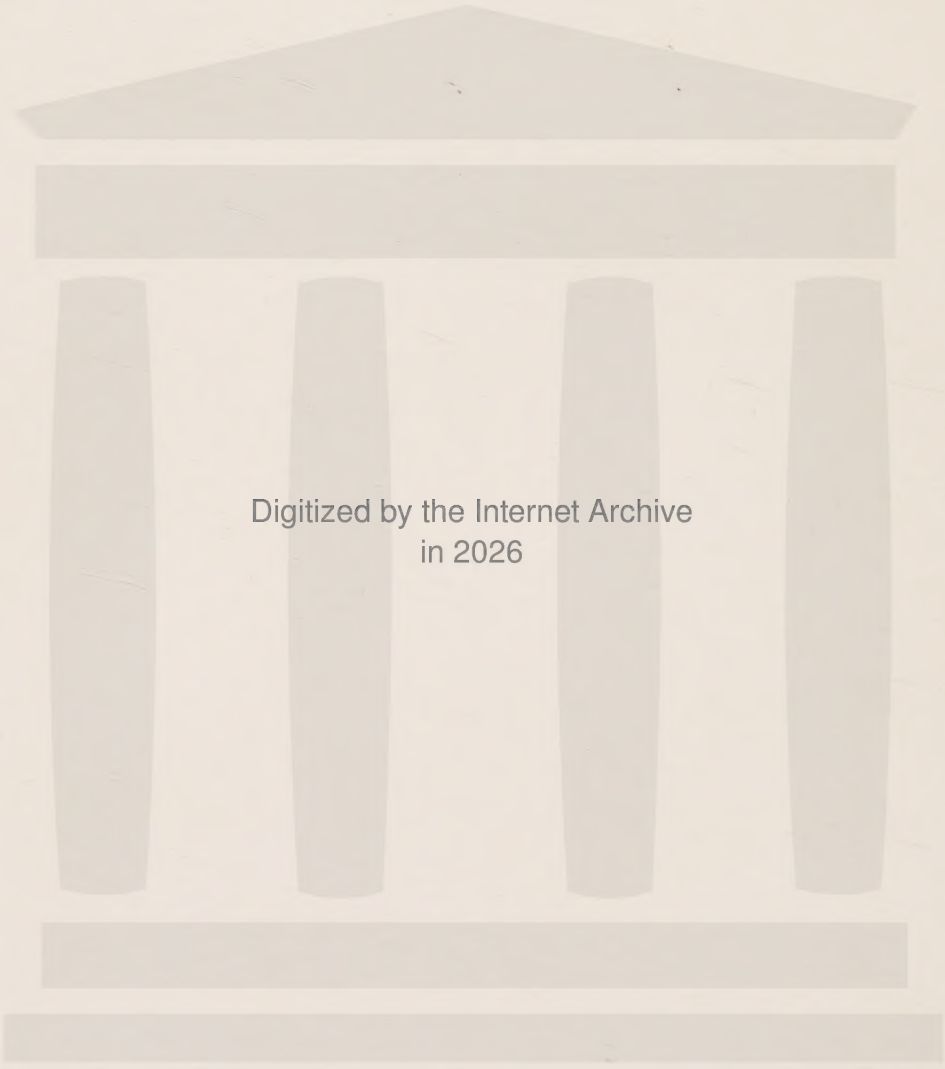
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The text was compiled by the editor from contributions by the relevant Subdirectorates and Divisions of the Sea Fisheries Research Institute and the Subdirectorate Resource Management of the Chief Directorate Sea Fisheries.

MISSION OF THE CHIEF DIRECTORATE SEA FISHERIES

To ensure effective protection and sustainable use of the living resources and ecosystems of the sea around the Republic of South Africa, the Chief Directorate Sea Fisheries of the Department of Environment Affairs

- *undertakes and supports applicable research in order to provide the best possible advice on resource utilization and protection,*
- *maintains effective administration of sea fisheries matters, and*
- *promotes sea fisheries development and policy in consultation with interest groups.*

EDITORIAL NOTE

This new series, South African Commercial Fisheries Review, *and the companion series,* Research Highlights of the Sea Fisheries Research Institute, South Africa, *replace the series* Annual Report of the Chief Directorate Sea Fisheries *and its predecessors. However, missing numbers of the defunct series will be issued to complete the time-series.*

The current Review aims to present the official statistics on the catches, production and monitoring of the South African commercial marine fisheries and to document changes in exploited stocks, in fishing, processing and marketing practices and in fisheries management and legislative measures. More detailed treatment of specific aspects can be found in the research series of the Sea Fisheries Research Institute and the international scientific literature.

1. INTRODUCTION

SOUTH AFRICA is one of a group of 22 medium-sized fishing countries that have caught between half a million and one million tons of fish annually during the period 1975–1991. Catches are dominated by two large fishery sectors, the demersal and pelagic, which between them have accounted for 88–95% of the reported annual catches for the same period. In recent years the demersal fishery has provided about half and the pelagic fishery about 20–25% of the total annual wholesale value of fish products, and the small but valuable crustacean fishery has contributed to the order of 12–18% of the total value.

Even though wholesale earnings from the sale of fish products reached an all-time high of about R1 318 million during 1991 (up 12% on 1990), total catches during both 1990 and 1991 were somewhat disappointing in that they barely exceeded half a million tons. The main reason was the partial failure of recruitment in the short-lived anchovy resource, a failure that caused the total allowable catch (*TAC*) to be reduced from a historical high of 600 000 t during both 1987 and 1988 to only 150 000 t in 1990 and 1991. It was encouraging to note a substantial recovery in the standing biomass of adult anchovy during the November 1991 survey. The biomass had in fact reached the second highest level recorded since the surveys started in 1984, suggesting that the *TAC* for 1992 could increase, provided that recruitment in 1992 returned to an average level.

A decrease of 9,4% in the total nominal catch by the demersal fishery did not result in decreased earnings, because the free-on-board wholesale value of the catch had increased by 11,3% to a record of nearly R680 million. Significantly lower demersal catches were reported for chub mackerel, horse mackerel and gurnard, but the all important resource of Cape hakes continued to improve, allowing a further rise of 3,3% in the *TAC* for this resource.

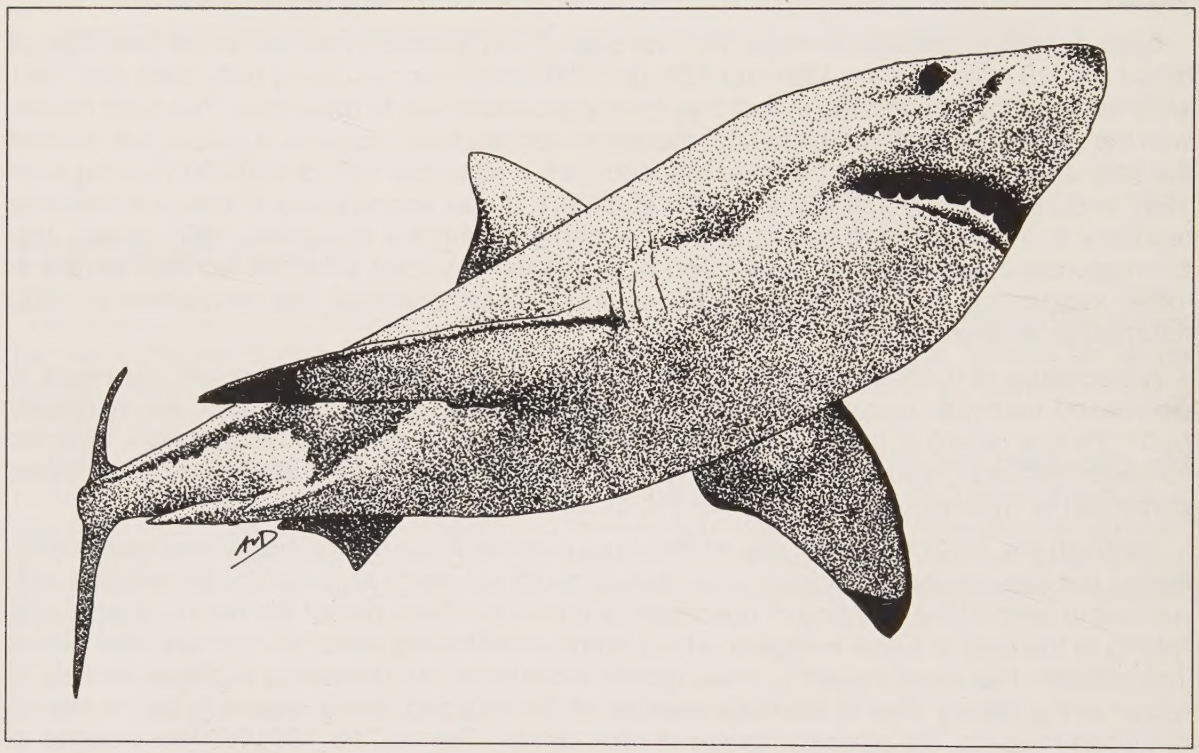
Although the *TAC* for 1990/91 was of the same order as those set for West Coast rock lobster during the past decade, this high-value fishery could not reach its target for the second year running in spite of the granting of concessions on the southern part of the fishing ground and fishing to the east of Cape Hangklip, where commercial fishing does not normally take place. The problem has been traced to small growth increments not permitting sublegal animals to recruit to the fishery. One of the main reasons for the retarded growth seems to be the dearth of ribbed mussels, the principal forage of rock lobster. The *TAC* for 1991/92 was reduced to 2 715 t, but soon after the commencement of the season in November this proved to be over-optimistic.

Two sectors experienced increased production during 1991. The squid-jigging fishery reported its second highest catch (6 624 t) since the inception of the fishery in the early 1980s. Interest in mariculture continued to grow and production from mussel-farming operations in Saldanha Bay nearly trebled to reach 1 962 t. The products of both these industries fetch high prices.

The Sea Fishery Act of 1988, which was amended in 1990, is in further need of revision and a Draft Bill was prepared for consideration in the 1992 Parliamentary Session. Matters to be addressed include the granting of greater powers to the Minister and to the Quota Board in certain respects, to regulate anew the granting of certain rights of exploitation, to extend the grounds upon which applications for certain licences may be refused, to make certain acts

punishable, to make it possible to obtain statistics on fish and fish products exported and to make different provision for the issue of certain permits and the fees payable.

A revision of *Marine Conservation: Do's and Don'ts* was issued in November 1991. The pamphlet summarizes fisheries legislation for the general public, and the recently changed minimum size limits for linefish and reduced bag limit for abalone (4) and alikreukel (5) are included. In May 1991 it also became illegal to catch or kill a great white shark or to buy or sell any product derived from it. This measure has been introduced because its low reproductive potential and slow growth make this animal vulnerable to overexploitation.



The great white shark *Carcharodon carcharias,* recently protected in South African waters

The research carried out on which management decisions are heavily dependent is dealt with in a new publication by the Sea Fisheries Research Institute, *Research Highlights.*

* * *

2. THE FISHERY AS A WHOLE

2.1 Total catch

SOUTH AFRICA made a total catch of 520 855 t in 1991 (Table I), 6% less than in 1990. The country therefore maintained its status as one of a group of 22 medium-sized fishing countries that have caught between half a million and one million tons annually during the period 1975–1991. Regular members of this group include countries such as Vietnam, Malaysia, Burma, Bangladesh, Brazil, Equador, France, U.K. (Scotland), Poland and Italy. The wholesale value of South Africa's catch increased by 12% to more than R1 310 million (Table II).

South Africa's world ranking has fluctuated between 19th and 29th, based on a world catch that has increased from 65,5 million tons in 1975 to nearly 100 million tons in 1990. Its highest ranking was attained in 1987. By comparison it is interesting to note that the group of fishing nations catching between 1 and 2 million tons of fish annually was composed of 13 nations, whereas those catching more than 2 million tons also totalled 13 countries. The latter group included the two top fishing nations, Japan and the U.S.S.R., that throughout the period 1975–1991 caught of the order of 10 million tons annually. These two countries were joined by China in 1988.

Table I: Total nominal catch and catch per sector of the South African commercial sea fisheries (Walvis Bay excluded but Mozambique included)*

Fishery sector	Nominal catch (t)	
	1990 1989/90	1991 1990/91
Seaweeds (wet mass)	17 866	16 578
Bait organisms	0,4	3
Mussels and oysters farmed	1 022	2 277
Oysters collected	85	70
Abalone	599	567
Rock-lobster fisheries		
West Coast	3 491	2 996
South Coast	951	946
Other	18	–
Subtotal rock lobster	4 460	3 942
Crustacean trawl	1 363	700*
Pelagic fisheries		
Factories	255 323	
Bait	4 072	
Subtotal pelagic fish	259 395	249 162
Linefisheries		
Tuna	5 153	2 851
Squid jigging	3 282	6 573
Handline fishery	14 988	13 683
Subtotal linefish	23 423	23 107
Mullet and St Joseph fishery	1 783	1 412
Demersal fisheries		
Trawls	243 530	222 293
Bottom longline	1 880	–
Subtotal demersal	245 410	222 293
Seals	–	–
Guano	433	520
Total	555 919	520 855

* Mozambique catches included in 1990, but not in 1991

With the exception of the years 1987 and 1988, when the total catch was in the region of 950 000 t, it has fluctuated between 582 000 and 685 000 t in the period 1975–1989. The catches in 1990 and 1991 were therefore the lowest recorded in the period 1975–1991 (Table I). Catches are dominated by the two largest fishery sectors, the demersal and the pelagic, which between them have accounted for 88,3–94,5% of the total reported catch in the years 1975–1991. The demersal fishery is the more stable and is dominated by the hake catch, which is regulated by quota. After peaking at 220 000 t in 1979 shortly after the declaration of a fishing zone of 200 nautical miles in November 1977, conservative hake quotas were allocated from the early 1980s to build up the stocks. From a low of 180 000 t in 1983 there has been a steady rise in the demersal catch to 243 530 t in 1990 (Table I), but the catch of 222 293 t in 1991 was more in

line with that of 1989 (221 806 t) although the hake quotas have actually been rising. The record catch of 1990 was mainly occasioned by excellent catches of the by-catch species, horse mackerel, chub mackerel, snoek and ribbonfish that were not maintained in 1991, particularly in the case of chub mackerel.

The pelagic fishery has traditionally been the largest contributor to the total catch. It has been remarkably stable considering the fluctuating nature of pelagic stocks, mainly because catches have been restricted by quota, namely an overall (multispecies) quota during the period 1971–1982 and individual species quotas for anchovy and pilchard since 1983. Pelagic catches fluctuated between 349 000 and 409 000 t in the period 1975–1991, with the exception of the years 1987 and 1988 when they totalled 674 000 and 677 000 t respectively, and the years 1990 and 1991 when they dropped to the lowest level since 1958 (Table I). Anchovy has been the single most important species in the pelagic catch since 1966, soon after anchovy fishing with small-mesh nets started on an experimental basis in 1963, and has consistently contributed more than half the pelagic catch since 1972. The anchovy quota was doubled to 600 000 t in 1987 and 1988 because acoustic surveys had shown both spawner biomass and recruitment to be high. A subsequent recruitment failure, however, necessitated lower anchovy quotas, 150 000 t in 1991, the lowest on record and the lowest anchovy catch since 1969. More details are given in the companion publication, *Research Highlights* **1** and in previous *Annual Reports of the Chief Directorate Sea Fisheries*.

2.2 The information base

THE catch figures presented in this document are in the main quite accurate, being a summation of the monthly landings reported by each company in each fisheries sector, a statutory requirement. In the fisheries controlled by quota, landings usually pass over scales that in some cases are controlled by Fisheries Control Officers of the Cape Provincial Administration. For some fisheries in which the catch is not always landed in the whole (round) state, particularly the demersal fishery, landings have been converted to nominal catch by the use of scientifically determined conversion factors based on the degree of processing carried out on board by the various fishing concerns. For some smaller fisheries for which numbers only are reported (e.g. the mullet and oyster sectors), a conversion to mass has been made by use of the best available information.

The monetary values presented in Table II are more of an estimate, not being based on a summation of sales of various commodities by companies throughout the year but rather on average prices realized as provided by companies consulted in this regard. However, the production figures presented throughout this report and which form one component in calculating values are regarded as quite accurate in most cases. The problem arising from a great variety of product lines produced by different companies is particularly acute in the demersal fisheries, the most valuable of them all. The value at landing or at first sale, which forms a part of the value-added wholesale price, is also problematical in those fisheries where the landed fish is either not caught by independent fishermen or not sold to a second party. Because of vertical integration in some fishery sectors and the provision of fuel and gear to fishermen, value at landing is often simply calculated for accounting purposes.

2.3 Monetary value of catches and products

VALUES in the present format have been available since 1986. The total value at landing and the wholesale value have increased year by year since then, except from 1989 to 1990 when the value at landing decreased by 16,4%. The corresponding wholesale value increased by only 2,7%. The increase of 10,5% in value at landing from R512,5 million in 1990 to R566,4 million in 1991 (Table II) was not enough to match the value of R613 million estimated for 1989, but the wholesale value continued to rise to a record of R1 317,8 million in 1991 compared with the R578,6 million in 1986.

Whereas the pelagic fishery makes the largest single contribution to catches, the demersal fishery is the largest contributor to values. The demersal fishery has consistently provided about half (47–58%) of the total wholesale value in the period under review. Products of the pelagic fishery have consistently come second at 19–26% in the years before the collapse of

Table II: Estimated values of landings and products of the various South African commercial fisheries (Walvis Bay excluded but Mozambique included*)

Fishery sector	Value (R million)			
	Landed 1st sale		F.O.B. wholesale (processed)	
	1990	1991	1990	1991
Seaweeds	3,639	3,639	4,298	6,904
Mussels and oysters farmed	8,075	15,661	11,536	22,373
Oysters collected	0,344	0,298	0,816	0,691
Abalone	5,400	7,321	24,813	23,528
Rock-lobster fisheries				
West Coast	69,510	74,875	104,115	102,216
South Coast	30,778	34,704	43,019	49,305
Other	0,216	–	0,585	–
Subtotal rock lobster	100,504	109,579	147,719	151,521
Crustacean trawl	17,599	11,754*	19,642	13,271*
Pelagic fishery(bait included)	48,006	49,213	189,003	185,810
Linefisheries				
Tuna pole fishery	8,850	16,654	10,896	19,653
Squid-jigging	26,256	53,236	32,820	75,156
Handline fishery	36,281	38,961	46,692	51,740
Subtotal linefish	71,387	108,851	90,408	146,549
Mullet and St Joseph fishery	1,894	1,430	3,407	3,410
Demersal fisheries				
Offshore	199,652	215,439	584,473	670,130
Inshore	27,849	23,397	53,968	59,531
Midwater trawl	16,778	11,997	30,239	25,868
Bottom longline	6,488	–	10,144	–
Subtotal demersal fish	250,767	250,833	678,824	755,529
Guano	4,924	6,175	6,155	8,218
Total	512,539	566,408	1 176,621	1 317,804

* Excludes catches made off Mozambique in 1991
N.B. R1 = ± $(U.S.) × 0,3 in early 1993

Table III: Licensed South African commercial fishing vessels in the fisheries zone of the Republic (1 July to 30 June) as at 4 December 1992

Registration area	Registration letters	≤4,99 m		5 – 7,99 m		8 – 11,99 m		12 – 19,99 m		> 20 m		Regional totals	
		1990	1991	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991
Walvis Bay	WB	5	4	4	5	–	–	–	–	1	1	10	10
Port Nolloth	PNA	129	125	–	–	2	1	7	7	–	–	138	133
Hondeklip Bay	HB	17	42	–	–	–	–	4	4	–	–	21	46
Vredendal District (including Doring Bay)	VR	115	114	1	1	1	1	7	7	–	–	124	123
Lambert's Bay	ADF	197	200	19	19	30	33	10	10	11	11	267	273
Piketberg District (including Elands Bay and Velddrif)	PQ	301	310	37	39	4	4	3	2	15	14	360	369
Saldanha Bay area	SBH	184	179	65	63	11	10	12	7	41	42	313	301
Vredenburg District (including Paternoster and St Helena Bay)	SH	328	311	49	52	27	26	18	20	26	26	448	435
Table Bay area (including Bok Bay and Yzerfontein)	CT	72	68	156	148	–	–	–	–	–	–	228	216
Cape Town Harbour	CTA	–	–	–	–	5	5	74	73	88	87	167	165
Hout Bay	HTB	6	7	8	8	13	14	73	77	21	18	121	124
Simonstown Harbour	STH	2	2	5	6	11	9	5	4	–	–	23	21
Simonstown area (including Cape Point and False Bay areas)	ST	128	117	146	146	1	1	–	–	–	–	275	264
Kalk Bay	KB	5	4	20	20	39	35	10	10	–	–	74	69
Somerset West District (including Gordon's Bay)	SW	50	48	126	124	11	9	4	3	–	–	191	184
Caledon and Hermanus Districts (including Hawston)	C	70	70	31	35	–	–	2	2	2	2	105	109
Gans Bay (including Klein Bay and Pearly Beach)	DDF	69	72	45	46	–	–	4	4	8	8	126	130
Bredasdorp District (including Waenhuiskrans and Struis Bay)	BR	40	38	109	113	22	22	–	–	–	–	171	173
Heidelberg District (including Witsand and Infanta)	SM	6	7	19	19	–	–	–	–	–	–	25	26
Riversdale District (including Still Bay and Puntjie)	R	28	29	68	76	1	1	–	–	–	–	97	106
Mossel Bay	MBA	–	–	4	5	10	10	8	6	23	23	45	44
George District	G	1	2	6	6	–	–	–	–	–	–	7	8
Knysna District (including Plettenberg Bay)	KN	4	3	21	24	–	1	2	2	–	–	27	30
Humansdorp District (including Jeffreys Bay and Oyster Bay)	H	4	5	117	132	10	13	9	11	–	–	140	161
Port Elizabeth area	PEA	1	2	19	21	10	11	48	48	15	15	93	97
Port Alfred District	P	1	2	59	74	1	3	–	1	–	–	61	80
East London area	ELA	1	1	26	23	1	1	–	1	–	–	28	26
Durban area	DNA	–	–	1	2	7	8	6	6	16	16	30	32
Natal coast	N	4	8	131	146	5	5	1	–	–	–	141	159
Total		1 768	1 770	1 292	1 353	222	223	307	305	267	263	3 856	3 914

1990 and 1991 when they accounted for only 14–16%. The small but valuable crustacean fisheries occupy the third place, their wholesale earnings being 12–18% of the total wholesale value. The linefisheries have been ranked fourth in any particular year, contributing 10–11% in most years, except in 1989 when a record squid-jigging catch boosted earnings for jigging to a record R78,4 million and the linefisheries total to 13%, and in 1990 when the percentage for linefisheries dropped to 8 because of a drop in the squid catch and earnings to below the levels in 1988. The squid-jigging catch was only worth R32,8 million in 1990, but catches and values improved in 1991, the latter to R75,2 million (Table II).

The poor performance of the fisheries in 1990 referred to above therefore may be largely attributed to lower catches by the pelagic and squid-jigging fisheries which were not compensated for by higher prices. In 1991 catches were lower than in 1990 in all the major fisheries (Table I), but total wholesale earnings improved substantially (Table II). The increased production in 1991 of the high-value but small squid-jigging and mussel- and oyster-farming operations was not enough to account for the overall improvement. Better earnings by the largest contributor, the demersal fishery sector, from a lower catch in 1991 must have played a role and indicate higher prices obtained, particularly on the export market which was buoyant and boosted by a strengthening of the U.S. dollar.

2.4 The South African commercial fishing fleet

WITH the new computerized licensing system having been introduced in 1990 some comparison is therefore possible. Commercial fishing vessels are now required to renew their licences annually (1 July – 30 June) and pay according to five categories based on length. Additionally, some (70 in 1990/91 and 69 in 1991/92) were licensed as factories. However, licensing does not confer the right to fish, and permits must be bought for each fishery sector in which the vessel is an approved participant. Only the permits for the various linefisheries have as yet been entered on computer. Details of such permits will be given under the relevant fisheries in this review.

The present discussion is confined to the numbers of craft of the various size categories licensed along the coast (Table III). A few provisos are attached to the registration areas: as in the past, these areas are best to be regarded as home ports because, for instance, most trap-fishers for South Coast rock lobster are registered in Cape Town and Hout Bay; also, the computer reconstruction is accurate as far as licences are concerned, but gives the registration area as at the later date when the summary was made. The result is that area transfers are to a certain extent masked. As regards licences, the fact that a boat is licensed and has presumably obtained a permit for a fishery does not mean that it fished for the entire year or at all. More information on fleets actually fishing are given in the reviews of some fishery sectors in this work.

The overall fleet increased slightly by 1,5% in 1991 to 3 941 vessels (Table III). This has been the first increase since 1969 when the fleet peaked at 7 816, and the present fleet is therefore about half that total. Since 1980 the shrinkage has been about one-third, from 5 727 craft.

The increase in 1991 was due solely to 4,7% more vessels in the length category 5–7,99 m being licensed, because the other categories remained stable or decreased marginally (Table

III). If this category is roughly equated with the ski-boat and motor ski-boat group used for licensing up to 1989, the trend is consistent in that this was the only group to have increased year by year, from 858 craft in 1980 to 1 450 in 1988 (an overall increase of 69%). All other categories had decreased more or less consistently since 1980, the most significant one being the smallest one — that of dinghies, for which a drop of 57% was recorded from 3 774 in 1980 to 1 636 in 1989. The numbers of 1 768 and 1 770 in 1990 and 1991 in the current smallest category of ≤4,99 m are in line with this. Right around the coast there has been a shift to somewhat larger vessels, but the main contributor has been the decrease in dinghies in the West Coast rock-lobster fishery. Besides a switch to larger vessels used in trap-fishing for West Coast rock lobster, fewer dinghies were used for hoopnet fishing and redundant dinghies were removed from the boat register. The rise in the number of craft of the ski-boat type holds the key to the rise in vessel numbers, particularly in 1991, which seems anomalous seeing that all fisheries except that for tuna have been closed to new entrants since the mid 1980s. Although the number of tuna permits had risen from 584 in 1985 to 1 138 in 1990, this dropped to 1 104 in 1991 (see Table XVIII under Linefish). A more likely explanation lies in the way the various line fisheries are now managed. Fishing effort is mainly regulated by fixing the number of crew a vessel may carry. Seeing that permits have been transferable under the new Sea Fishery Act since 1 July 1990, whereas previously a permit was coupled to a boat, the same number of crew may now be employed on two smaller vessels or the crews of two small vessels combined on one larger vessel, so raising or lowering the number of vessels.

If the trends in vessel numbers are examined on the basis of registration areas, 11 areas showed a decrease from 1990 to 1991, 3 were unchanged and 16 increased. The decreasing areas were mostly on the West Coast down to False Bay and the largest contributor was the smallest length category of vessels. The increasing areas lay to the east of that and mostly involved the next longer category (5–7,99 m). On a wider basis, on the geographical West Coast (PNA to BR), the number of craft decreased from 3 152 in 1990 to 3 135 (82 to 80%), and on the coast eastwards of that there was an increase from 694 to 769 vessels. These trends have been persisting since at least 1986, when the percentage licensed on the geographical West Coast had been 86. The increase on the East Coast is tied to the development of the squid-jigging fishery since 1983 and a resurgence in interest in the handline fishery.

* * *

3. FISHERY SECTORS

3.1 Seaweeds

FEW species of South African seaweeds are commercially important and exploitation is limited to the Cape. The Department of Environment Affairs exercises control through a permit system, for which purpose 17 Concession Areas are each allocated to one permit-holder only who pays an annual fee and a levy on what is taken. Two types of permit are made available, one for collecting and harvesting rights, the other allowing harvesting only on an experimental basis, the experiments being under the control of the Sea Fisheries Research Institute. Currently all permit-holders possess both types of permit.

The establishment of the Mariculture Association of Southern Africa in 1990, and more especially of its affiliate the Abalone Farmers' Association, intensified current commercial interest in harvesting fresh seaweeds because they constitute an important feed for abalone. The abundant kelps (large brown seaweeds) on the coast west of Cape Agulhas are of particular importance. Preliminary experiments have indicated that up to 7 t fresh frond (the leaf-like portion) of kelps per day are needed for a viable farming operation. Two sites likely to render such yields have been identified for two farmers at Danger Point near Gans Bay, and experimental harvesting has started.

Kelp harvesting at Kommetjie for the production of an agricultural growth stimulant

Fresh kelps, however, are already harvested experimentally at Soetwater, Kommetjie, for local production of a growth-stimulant for agricultural crops (Table IV). During this review period 223 t ($\frac{2}{3}$ stipe, i.e. the stem-like trunk, and $\frac{1}{3}$ frond) was processed for this purpose and almost all was exported.

Kelp-casts are collected as a source for important industrial chemicals called alginates (Table IV). South Africa does not have an alginate-extraction industry and all its collections are dried, milled and exported. This past year, following a worldwide trend, the demand has remained somewhat depressed and only about 2 000 t of raw material was handled (Table IV). This quantity has a potential alginate yield of up to 600 t depending on the quality. South Africa's total needs of a variety of alginates annually amount to some 250 t. The quality of the alginate is determined in the processing and cannot be adjusted subsequently, which means that a single processing technique cannot satisfy all local needs. Nevertheless, the perennial interest in erecting a South African plant for producing alginate persists.

By contrast with alginates, quality of agars, also unique seaweed products, is determined by the source only, so that some raw materials are more valuable than others. Therefore, *Gelidium pristoides,* harvested especially from the Port Elizabeth and East London areas, is highly prized and priced so that the effort of gathering the rather small annual yield is fully justified, especially as Sea Fisheries scientists have proved that this operation does not harm the environment. About 80 t (dry mass) of this seaweed, augmented by about 20 t of the less valuable *Gelidium abbottiorum*, was gathered during the year (Table IV). Commercially, the art of making utilizable agars lies in the blending; no one has mastered this better than the Japanese, to whom all South African raw material is exported.

Table IV: Seaweeds gathered and exported (kg dry mass)

Concession area (C.A.)	Kelp: Mixed *Ecklonia maxima* and *Laminaria* spp.		*Gelidium* spp.		Total	
	1990	1991	1990	1991	1990	1991
			Gathered			
1	–	–	92 257	100 881	92 257	100 881
2–4	–	–	–	–	–	–
5–8	513 643	596 694	–	–	513 643	596 694
9	29 449	–	–	–	29 449	–
10	–	–	–	–	–	–
11	135 500	29 400	–	–	135 500	29 400
12	63 000	37 700	–	–	63 000	37 700
13–14	575 729	518 896	–	–	575 729	518 896
15	484 000	523 950	–	–	484 000	523 950
16	319 000	264 766	–	–	319 000	264 766
17	–	–	–	–	–	–
Total	2 120 321*	1 971 406†	92 257	100 881	2 212 578*	2 072 287†
			Exported			
Total	1 963	2 032	84	117	2 047	2 149

* Excludes 157 058 kg wet mass (dry mass *c.* 23 588 kg if 15% moisture assumed) of harvested kelp in Area 9, of which 129 t (wet) was processed

† Excludes 223 759 kg wet mass (dry mass *c.* 33 606 kg) of harvested kelp in Area 9

Another local agar-producer is *Gracilaria verrucosa*. As in the past few years, Saldanha Bay has yielded nothing in the way of this seaweed during 1991. On the other hand, St Helena Bay, not formerly notable for supplying this commodity, is looking promising.

3.2 Hard corals

AN experimental permit to harvest 1 000 kg of *Allopora* spp. was granted from March to September 1991 in the area from Struis Bay to Quoin Point at depths greater than 20 m. One entrant is involved, operating from a ski-boat and using conventional SCUBA gear. The collections for the year under review, intended for the ornament/curio trade, finally amounted to 382 kg.

3.3 Bait organisms

ONE permit was issued for the collection of white mussel *Donax serra* from the West Coast for bait purposes, and 10 400 mussels were harvested. Landings for 1990 were 10 300.

Only 20 kg of sand clam *Mactra glabrata* were collected commercially for bait, and in 1990 none.

Although a negligible quantity of redbait *Pyura stolonifera*, which is a by-product of the Saldanha-based mussel farming, was marketed last year, the total rose to 2 275 kg in 1991.

3.4 Mussel farming

THIS industry, which is based mainly on the introduced black mussel *Mytilus galloprovincialis* in the Saldanha Bay area continues to expand, there being four producers. Total production in 1991 was 1 962 t compared with 707,6 t for 1990. Production in the Port Elizabeth area has almost ceased, at 0,9 t compared with 80,9 t in 1990. This is so because the producers concentrated on oyster farming there. Of these bivalves, some 1,3% are sold fresh, the rest being distributed to the catering market, mostly frozen but 30% are smoked and canned.

3.5 Oysters

THE number of "wild" oysters *Striostrea margaritacea* collected from the intertidal zone along the South Coast by "pickers" dropped again. In total 662 073 were collected in 1990, and 518 242 in 1991 (Table V). These figures include marketable "wash-ups", which are legal-sized oysters that come loose from the rocks and wash out in a fresh state. The number of pickers for the corresponding years was 171 and 143. In addition 30 000 *S. margaritacea*, which were collected but found to be undersize, were retained to be grown out to marketable size.

Production of the cultivated oyster *Crassostrea gigas* reared from imported spat remained stable at 4,1 million in 1990 and 1991 (Table V). A recent entrant from Walvis Bay produced 106 000 oysters.

3.6 Abalone

CATCH rates of commercial divers, as well as the average sizes of abalone landed in the seven fishing zones, provide the baseline information on which the fishery is managed. Catch and catch per unit effort (*cpue*) for each zone is shown in Table VI for the past two seasons and in Figure 1 trends in *cpue* from 1985/86 to 1990/91 for the most important zones, A to D,

Table V: Commercial oyster production and permits

Locality/Product	Number of legal-sized oysters		Number of marketers*	Number of collectors with permits	
	1990	1991		1990	1991
Picked and marketable "wash-ups"	662 073	518 242	16	171	143
Cultivated and fattened wash-ups					
Walvis Bay	–	106 000	1		
Saldanha Bay	361 084	493 976	3		
Knysna	2 813 087	2 005 230	2		
Port Elizabeth	918 227	1 475 212	3		
Subtotal grown	4 092 398	4 080 418	9		
Total	4 754 471	4 598 660	25		

* Marketers involved in more than one concession area or activity were counted separately for each

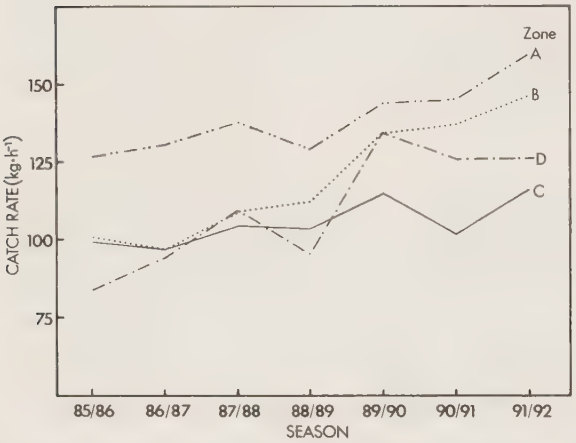


Fig. 1: Trends in catch per unit effort of abalone, 1985/86–1990/91

are presented.

Figure 1 shows that the catch rates in Zones A and B may be stabilizing at a new higher level. In Zone C, *cpue* has returned to past levels and in Zone D it continues to fluctuate as in the past, although with an increasing trend. The catch rates from Robben Island (Zone F), where there is still a high proportion of old accumulated stocks, have fluctuated at high levels since 1987/88 (varying between a low of 217 kg·diver-h^{-1} in 1988/89 and a high of 404 in 1989/90). Zone E, however, shows a trend of declining catch rates from values of 97–112 kg·diver-h^{-1} in 1987–1989 to 67–71 in the past two seasons (Table VI).

Table VI: Catch and catch rate for the seven abalone fishing zones

Zone — Area	Catch (t)		Catch rate (kg·diver–h^{-1})	
	1989/90	1990/91	1989/90	1990/91
A Quoin Point — Pearly Beach	200	184	144	145
B Franskraal — De Kelders	141	138	134	137
C Hermanus — Hawston	157	160	115	102
D Kleinmond — Holbaai Point	46	50	135	126
E Cape Point — Mouille Point	5	7	71	68
F Robben Island	50	28	404	310
G Table Bay — Cape Columbine	–	–	–	–
All zones	599	567	138	128

In general, the traditional fishing grounds between Cape Hangklip and Quoin Point therefore appear to be continuing the trend of overall stability that has been evident since the early 1980s. However, complaints by the divers of stock shortages in Zone E appear to be confirmed by a declining *cpue*, while the *cpue* at Robben Island continues to fluctuate at a high level. No Total Allowable Catch (*TAC*) was allocated for Zone G, a situation which is likely to continue in future because of apparent recruitment problems on the West Coast.

The *TAC*s per zone for the 1990/91 and 1991/92 seasons are illustrated in Figure 2. The overall receiving quota for 1990/91 amounted to 595 t. However, because of the difficulties experienced in the western part of the grounds only 566 t was landed, down on the 599 t in 1989/90 when the quota had been 625 t.

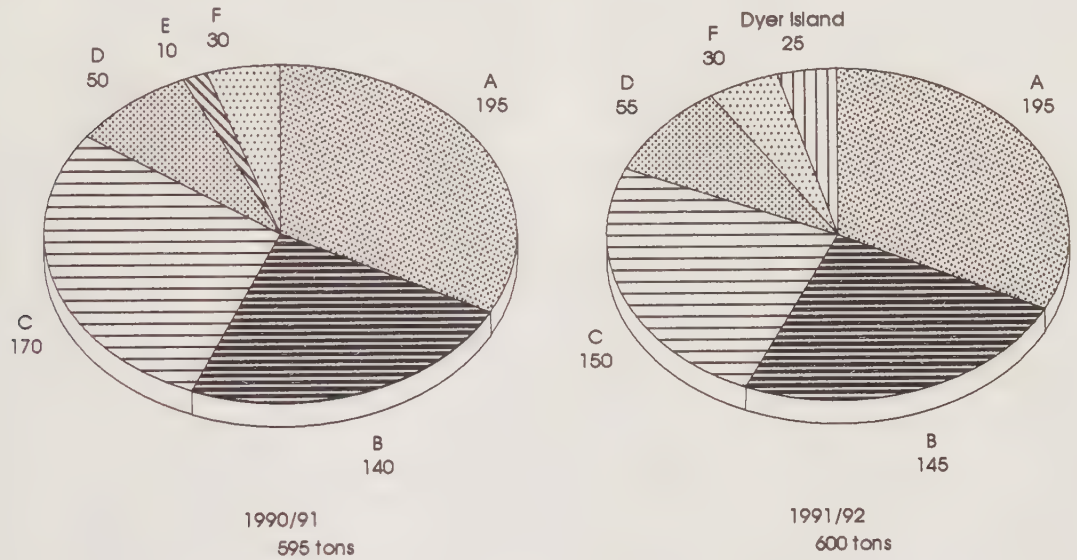


Fig. 2: Total allowable catches (tons) for abalone per fishing zone, 1990/91 and 1991/92 seasons

The whole-mass receiving quota for the 1991/92 season (November 1991 to July 1992) was again based on recommendations submitted by the Sea Fisheries Research Institute to the Sea Fisheries Advisory Committee. The sum of the *TAC*s for Zones A to G was set at 600 t, an increase of 5 t. Increases of 5 t in *TAC* were allowed for Zones B and D, which were offset by the removal of the 10-t *TAC* for Zone E in response to continuing declines in catch rates there. The Dyer Island area was again opened to fishing after a six-year closure, but at a conservative 25 t in order to maintain high stock levels. The *TAC* for Zone C was reduced by 20 t. Zone G was not allocated a *TAC*. Figure 2 clearly shows that, as a result of the low productivity of the West Coast, there is now a major dependence of the fishery on Zones A to D, east of Hangklip.

Since its introduction in 1983 the whole-mass quota has been progressively reduced from 660 t to 595 t in 1990/91. Production of commodities, mostly for export, has concomitantly dropped from 169 t in 1984 to 135 t in 1990/91, the decrease over the past two seasons being 1,3 t (Table VII). More abalone was marketed in the form of frozen meat in 1990/91 than in

Commercial collection of abalone off Robben Island. Clockwise: diver prising abalone off rocks; full bag being air-lifted to the surface; bag being transferred to dinghy; and good catch typical of this area being taken to mother vessel

Table VII: Commercial production of abalone

Commodity (kg)	1989/90	1990/91
Canned*	119 695	108 140
Frozen (shelled)*	16 643	25 576
Fresh/Frozen (in shell)	–	1 362
Total	136 338	135 078

* To convert to whole mass, multiply canned by 4 and frozen (shelled) by 3

1989/90 (Table VII), and as a percentage of total production it rose from 12,2 to 18,9, a comparable level of 18,2% last being attained in 1982. The production of whole frozen or fresh abalone has dropped to low levels since reaching percentages of between 9,9 and 13,6 in the years 1984 to 1986/87, when the drive to promote the local marketing of abalone had been most active.

3.7 Cephalopods

SOUTH African cephalopods utilized by fisheries include several species of squid, cuttlefish and octopus. Most of these are by-catches of fisheries for other species. There is only one directed local fishery, and that is for the chokka squid *Loligo vulgaris reynaudii*.

Chokka squid *Loligo vulgaris reynaudii* feeding in an aquarium

It is taken mainly off the South-East Coast by a fleet of more than 200 mostly small vessels, including ski-boats, catamarans and deckboats (Table VIII). Limitation of fishing effort was introduced in 1987, when 295 permits were granted to squid-jigging vessels. The number of vessels has been lower since then, but the 293 permitted in 1991 is similar to the original

Table VIII: Permits for jigging (C), transporting (X) and processing (F) squid granted to licensed South African commercial fishing vessels (1 December to 25 or 31 October) as at 7 December 1992*

Registration area	Registration letters	1989/90 (1 Dec.–30 Oct.)			1990/91 (1 Dec.–25 Oct.)		
		C	F†	X	C	F†	X
Saldanha Bay area	SBH	2	2 (1)	–	–	1 (1)	–
Vredenburg District (including Paternoster and St Helena Bay)	SH	4	1	–	2	1	
Cape Town Harbour	CTA	4	12 (8)	–	3	10 (8)	–
Hout Bay	HTB	23	18 (3)		28	21 (2)	
Kalk Bay	KB	50‡	4	–	52‡	4	–
Caledon and Hermanus Districts (including Hawston)	C	1	–	–	1	–	–
Gans Bay (including Klein Bay and Pearly Beach)	DDF	3	2	–	2	2	–
Bredasdorp District (including Waenhuiskrans and Struis Bay)	BR	2	–	–	1	–	–
Mossel Bay	MBA	3	–	–	2	–	–
George District	G	2	–	–	2	–	–
Knysna District (including Plettenberg Bay)	KN	12§	–	1	13§	–	1
Humansdorp District (including Jeffreys Bay and Oyster Bay)	H	96	1	6	103	1	5
Port Elizabeth area	PEA	43	5	4	56	5	5
Port Alfred District	P	25§	–	–	26§	–	
Natal coast	N	–	–	–	2	–	–
Total		270‡§	45 (12)	11	293‡§	45 (12)	21

* It is a prerequisite to the granting of a C-permit that such vessels also have at least a linefishing permit
† The first number is of vessels licensed to process squid, including those that also may fish; the figure in parentheses is of those licensed only to process but not to catch (so-called mother vessels)
‡ Includes 46 vessels in both seasons restricted to fishing for squid as bait in False Bay
§ Includes 3 vessels from Knysna and 24 from Port Alfred in both seasons restricted to fishing for squid as bait in those two areas

figure. Number of crew rather than number of vessels has been the main criterion, so crew may be split between two vessels or concentrated on one vessel instead of two, seeing that permits are freely transferable. All squid vessels are obliged to have a permit for handline fishing and most are active in that fishery too.

Because chokka is a short-lived species with highly variable recruitment, its management has not yet included the setting of *TAC*s. Instead, the fishery has been managed by a system of effort-control measures. They include an upper size limit to the fleet with strict criteria for vessel replacement, an annual closed season at peak spawning time and a *de facto* closed area (the Tsitsikamma National Park) overlapping the spawning grounds. Since 1985, this has been one of the few enduring squid fisheries in the world, the catch varying between 2 800 and 9 800 t.

Table IX: Squid catches (t) by various sectors of the fishery

Sector	1990	1991
Foreign trawl	139	33
South African trawl		
Red squid	53	78
White squid	606	463
Subtotal S.A. trawl	659	541
Crustacean trawl	6	3
Jigging	3 282	6 624
Total all sectors	4 086	7 201

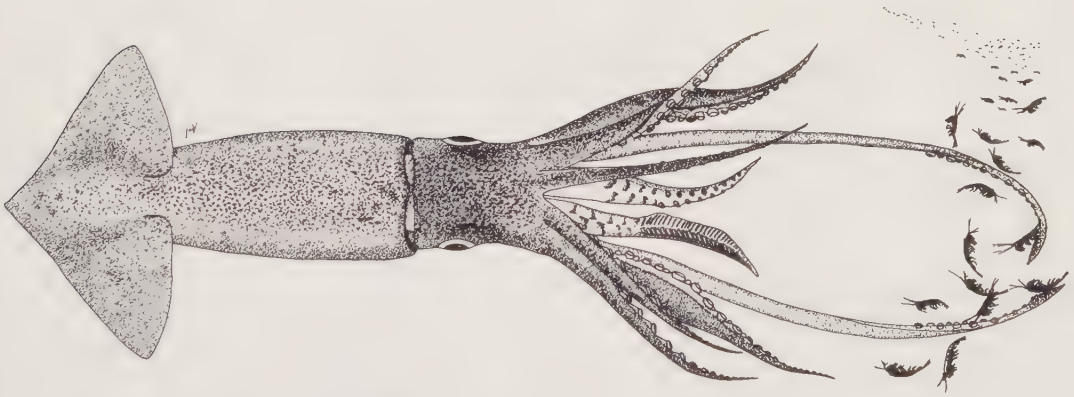
In 1991, the jig catch was the second highest since the inception of the fishery, at 6 600 t (Table IX), the bulk of the catch (60%) being

taken from September to November. The catch was double that of 1990. Most is exported to Europe (mainly Italy and Spain). The estimated wholesale value of these exports in 1991 was R75 million (see Table II), which makes squid one of South Africa's most valuable fisheries.

There is a small by-catch of squid in the demersal trawling fishery (Table IX). The yield has been at a fairly low level in recent years and in 1991 it was the lowest since 1987 at 463 t, down from 606 t in 1990 and a peak exceeding 2 000 t in the late 1970s. The estimated wholesale value of the 1991 trawl catch of squid was some R2 million. Foreign trawl catches have also been declining as these vessels have been withdrawn from South African waters. From about 2 300 t in 1983, their catches have declined to only 33 t in 1991 (Table IX).

There is a very limited market for other species of squid, the so-called red squids *Todaropsis eblanae* and *Todarodes angolensis*. The catch is suspected to be much higher than the landings, because most are discarded for lack of a market. The reported catches were 53 t in 1990 and 78 t in 1991 (Table IX), down from a peak of 260 t in 1988.

The Angolan flying squid *Todarodes angolensis*



The lesser flying squid *Todaropsis eblanae*

Octopus species taken in South Africa are not identified to species, but it is known that *Octopus vulgaris* is caught in shallow water and from the rocks, whereas *O. magnificus* is a by-catch of trawlers on the West and South coasts. It is thought that the main species on the East Coast is *O. cyanea*.

Significant catches of octopus were once reported by the rock-lobster boats as by-catch and by bait collectors, but most of these licences have been withdrawn in recent years, and reported catches can now be regarded as insignificant.

About 62 t of octopus was reported from the West and South Coast demersal trawling fishery for 1991. This compares with 44 t the previous year, but the catch is considerably down from 1988, when it peaked at 115 t.

The East Coast crustacean fishery continues to make a small contribution to South African cephalopod landings with 4,4, 21,4 and 4,9 t of squid (mainly *Loligo duvaucelii*), octopus (mainly *O. cyanea*) and cuttlefish (species unknown) respectively landed in Durban (Table X).

Table X: Cephalopod catches (in kg) off Natal by the East Coast crustacean fishery

Species	1990	1991
Squid	6 314	3 043
Octopus	16 127	19 856
Cuttlefish	1 756	4 749
Total	24 197	27 648

In contrast to previous years, catches made off Mozambique are no longer landed in Durban, because the South African companies fishing in Mozambique have entered into joint-venture agreements in terms of which the catches are landed in Maputo. The data indicate that octopus and cuttlefish catches are rising, whereas those of squid are declining.

3.8 Whelks and crabs

AN experimental permit for this new fishery was granted in April 1989. It was initially intended as a crab fishery for *Ovalipes trimaculata*, with a whelk *Bullia* spp. by-catch, but it has now changed to a whelk fishery with a crab by-catch. There is one entrant, who operates from a ski-boat and utilizes modified ring nets in sandy areas.

Low densities that were not commercially viable were found along the east coast from Cape Agulhas to Mossel Bay by experimental fishing. However, on the West Coast high densities seem to indicate that the resource can sustain a small fishery.

Annual landings of crab have declined, from 683 kg live mass in 1989 to 130 kg in 1990 and 49 kg in 1991. Whelk landings were 3 740 kg live mass in 1989 and 2 183 kg in 1991, but were much lower in 1990 at 240 kg.

3.9 Crustaceans

3.9.1 WEST COAST ROCK LOBSTER

THE *TAC* set for West Coast rock lobster in the 1990/91 season was similar to those set over the past decade. *TAC*s per area (each subject to a tolerance of 7,5%) are shown in Table XI.

Early into the season it became apparent that catch rates were low and that the *TAC*s were unattainable. Analysis of growth data from the 1990 moult has since revealed that moult increments were well below those recorded in previous years. The consequence of this was that fewer than normal lobsters recruited into the fishery (see the publication *Research Highlights* for further information).

The only ground to have had relatively normal catch rates was Area 8 in the south. In view of the poor catches experienced in other areas, the Minister of Environment Affairs granted an

Table XI: Actual catches of West Coast rock lobster in 1989/90 and 1990/91 and Total Allowable Catches (*TAC*s) for the 1990/91 and 1991/92 seasons per fishing zone

Area	Number	Zone	Actual catch (t)		*TAC* (t whole)	
			1989/90	1990/91	1990/91	1991/92
Port Nolloth	1	A	73	30	90	40
Hondeklip Bay	2		19	9		
Lambert's Bay	3	B	367	272	440	255
Elands Bay	4		460	238	530	223
St Helena Bay	5	C	763	686	1 000	641
Saldanha Bay	6					
Dassen Island	7	D	1 086	716	1 050	657
Cape Peninsula	8		637	785*	630	799
Robben Island	9		49	–	–	50
Hout Bay/Oudeschip	10		20	20	20	20
False Bay	11		17	30	30	30
East of Hangklip			–	210		
Total			3 491	2 996	3 790	2 715

* Includes catches made in deeper water under special concession (150 t)

additional 150 t in Area 8 (over and above the *TAC* and the 7,5% tolerance), as a relief measure for rock-lobster quota holders from other parts of the West Coast.

Some commercial fishing took place in a non-traditional fishing area to the east of Hangklip. Catches were good (Table XI), but the resource there was not considered to be large, and the area was therefore closed in order to protect the interests of recreational fishermen who have traditionally frequented it.

The *TAC* allocation of 20 t as part of the Hout Bay culling experiment was caught over the period December 1990 – January 1991. Catches rates (1,9 kg·trap-haul^{-1}) were the lowest that have been recorded since the culling programme began.

The final figure for the 1990/91 season was 2 996 t, a full 21% short of the *TAC* allocation and 14% below the landings in 1989/90.

Export and local market sales for the 1989/90 and 1990/91 seasons are presented in Table XII. Trends in the 1990/91 season reversed the pattern of increased sales of whole cooked and live lobster and, for the first time in several years, the whole frozen product dominated the trade. The reason for the change was that good prices were achieved for this product during the season. However, predictions are that the demand for whole raw product will probably not persist into the 1991/92 season.

Table XII: Sales of West Coast rock-lobster products

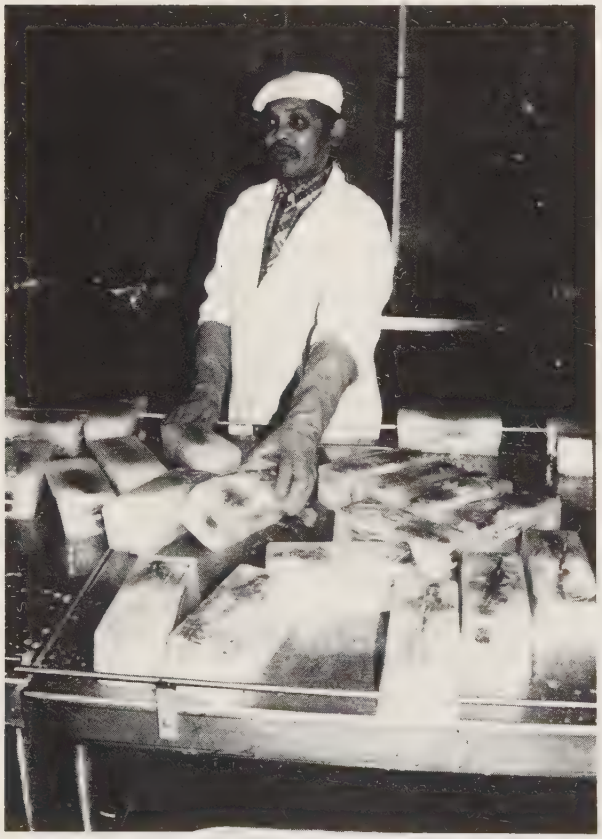
Commodity (kg as specified)	Export		Local		Total	
	1989/90	1990/91	1989/90	1990/91	1989/90	1990/91
Frozen tails*	214 270	148 748	56 296	59 765	270 566	208 513
Whole cooked, frozen	791 250	501 870	234 810	147 215	1 026 060	649 085
Whole raw, frozen	509 908	1 033 219	77 870	90 062	587 778	1 123 281
Live	512 390	324 705	227 650	207 136	740 040	531 841
Total	2 027 818	2 008 542	596 626	504 178	2 624 444	2 512 720

* To convert to whole mass divide by 0,3011

For the 1991/92 season the quota was severely reduced to 2 715 t (see Table XI). The cuts affected all the northerly areas (Nos 1–7) and only off the Cape Peninsula (Area 8) was the *TAC* raised.

3.9.2 SOUTH COAST ROCK LOBSTER

THE production quota of 450 t tail mass remained unchanged and was once again caught in full in the 1990/91 season. Certain discrepancies were found in *cpue* statistics for the 1990/91 season and for information presented previously. The result of these discrepancies is that all effort information as published in previous *Annual Reports* has been rejected as inaccurate and a new catch/effort series will start in 1992.



Whole frozen rock lobster being processed

Production of South Coast rock lobster continued the trend (albeit at a slower rate than in previous years) away from frozen tails towards the high-value whole frozen commodity (Table XIII).

Table XIII: Production of South Coast rock-lobster commodities

Commodity (kg as specified)	1989/90	1990/91
Frozen tails	327 775	321 762
Whole raw, frozen*	125 957	136 662
Live*	120 777	117 056
Total	574 509	575 480

* To convert whole mass to tail mass, multiply by 0,465

3.9.3 EAST COAST CRUSTACEANS

THERE were changes in this fishery in 1991 in that two companies that had fished in

Table XIV: Landings (kg whole mass) of the East Coast crustacean trawl fishery

Species	1990			1991
	South Africa	Mozambique	Total	South Africa
Inshore prawns (Tugela)	82 180	–	82 180	98 359
Offshore prawns (pink)	279 687	301 127	580 814	246 133
Langoustine	48 753	232 850	281 603	50 978
Shrimps	6 603	–	6 603	520
East Coast deep-water rock lobster	13 698	10 632	24 330	18 000
Shovelnose rock lobster	50	–	50	396
Inshore crab (Tugela)	15 975	–	15 975	5 766
Offshore crab (Red)	61 228	126 929	188 157	185 902
Squids	6 314	42 347	48 661	3 043
Octopus	16 127	33 274	49 401	19 856
Cuttlefish	1 756	180	1 936	4 749
Fish	43 959	39 657	83 616	66 645
Total	576 330	786 996	1 363 326	700 347

both Natal and Mozambique waters in the past opted to continue their Mozambique operation as a joint venture with the Mozambican government. Under this arrangement all catches made in Mozambican waters were landed in that country and not in South Africa (unlike the situation prior to the joint venture).

Unlike in the past, in 1991 permits were only issued to boats actively fishing in South African waters. As a consequence the number of permits declined to 7, compared with 20 in 1990.

Catches in Natal waters were 22% higher, but their composition differed much from 1990 (Table XIV). This variability is a feature that would be expected from short-lived animals such as prawns and squid, but the increases in the 1991 landings of the longer-lived crabs (up more than 200%) and lobster (up 30%) cannot be explained from the available information.

3.10 Pelagic fish

3.10.1 CATCH

THE total catch of pelagic fish, including the bait catch, was 249 162 t, nearly 10 000 t down on 1990 (Table XV) and substantially less than the 1989 figure of more than 400 000 t.

As in 1990, the anchovy catch was the primary reason for the relatively low overall figure. In 1991 a total of 150 560 t of anchovy was caught, slightly in excess of the *TAC* of 150 000 t. The results of the November 1990 biomass survey had estimated the anchovy resource to amount to 469 000 t, its lowest level since acoustic surveys were started in 1984. At the start of the 1991 fishing season, a *TAC* of only 100 000 t was therefore set. As a result of this low *TAC*, the anchovy catches during the first few months were low and, by the end of May, 91 810 t of anchovy had been caught.

Fortunately, the recruitment survey in May 1991 showed considerably better recruitment during 1991 than in 1989 and 1990, and it was possible to increase the *TAC* to 150 000 t at the mid-year revision. The pelagic industry rapidly took advantage of this increase and the catch in June 1991 was in excess of 50 000 t (Table XV).

Table XV: Landings of pelagic fish at South-Western Cape factories and by bait boats in 1990 and 1991 (reported species composition adjusted by counts of fish samples by C.P.A. Fishery Control Officers)

Month	Anchovy		Pilchard		Horse mackerel		Chub mackerel		Round herring		Lanternfish		Other*		Total	
	ton	%	ton	%	ton	%	ton	%	ton	%	ton	%	ton	%	ton	%
January	165	0,1	2 497	4,8	1	0,2	26	0,3	256	0,8	50	7,6	8	0,4	3 003	1,2
February	2 933	1,9	6 167	11,9	15	2,7	306	3,1	13 878	41,4	12	1,8	238	11,4	23 549	9,5
March	29 118	19,3	5 341	10,3	43	7,8	120	1,2	8 275	24,7	92	13,9	164	7,8	43 153	17,3
April	36 722	24,4	8 860	17,1	171	31,2	9 359	94,9	9 144	27,3	121	18,3	497	23,7	64 874	26,0
May	22 872	15,2	8 054	15,5	166	30,3	53	0,5	1 687	5,0	387	58,5	625	29,8	33 844	13,6
June	51 519	34,2	7 765	14,9	119	21,7	1	0,0	166	0,5	–	–	133	6,3	59 703	24,0
July	6 106	4,1	5 740	11,0	17	3,1	–	–	21	0,1	–	–	156	7,4	12 040	4,8
August	1 091	0,7	3 999	7,7	16	2,9	–	–	56	0,2	–	–	146	7,0	5 308	2,1
September	25	0,0	1 586	3,1	–	–	–	–	–	–	–	–	74	3,5	1 685	0,7
October	9	0,0	1 329	2,6	–	–	–	–	1	0,0	–	–	54	2,6	1 393	0,6
November	–	–	258	0,5	–	–	–	–	–	–	–	–	–	–	258	0,1
December	–	–	352	0,7	–	–	–	–	–	–	–	–	–	–	352	0,1
Total (1991)	150 560	99,9	51 948	100,1	548	99,9	9 865	100,0	33 484	100,0	662	100,1	2 095	99,9	249 162	100,0
Percentage		60,4		20,8		0,2		4,0		13,4		0,3		0,8		99,9
Total (1990)	150 152		56 186		7 204		22		44 851		571		409		259 395	
Percentage		57,9		21,7		2,8		0,0		17,3		0,2		0,2		100,1

* Juvenile gurnard, mantis shrimps, snoek, buttersnoek, hake, jellies and ice but also small quantities of other species

The pilchard biomass was estimated to be 263 000 t in November 1990, which was substantially lower than the 355 000 t measured at the same time the previous year. However, there was still a reasonably high abundance of two- and three-year-old fish and, despite the large drop in total biomass, the *TAC* was only reduced by 6 000 t to 50 000 t for 1991. This *TAC* was also exceeded slightly, with a catch of 51 948 t.

The catch of horse mackerel (maasbanker) was only 548 t, compared with 7 204 t in 1990. The catches in 1988 (6 300 t) and 1989 (25 500 t) were also higher than those of the rest of the 1980s. The low catch in 1991, more consistent with other years over the past decade, suggests that the yields of the three previous years may have been just a pulse, in either abundance or availability, which has now passed through the system.

The only species that showed a major improvement in comparison with 1990 was chub mackerel, which accounted for 9 865 t as against 22 t in 1990. This species was regularly caught in annual quantities of 30 000 t or more from the mid-1950s to the mid-1970s, but it then became far less plentiful in pelagic catches. The 1991 catch was the highest of this species since 1977.

The catch of round herring (redeye), 33 484 t, was consistent with recent trends and, as in previous years, probably reflected changes in availability to the pelagic fleet, rather than changes in abundance. Since 1966, the annual catch of round herring has varied from a low of 1 300 t

Table XVI: Pelagic fishing industry: production of South-Western Cape factories in 1990 and 1991

Month	Meal		Body oil		Canned									
					Anchovy		Pilchard		Chub mackerel		Round herring		Total	
	ton	%	ton	%	kg	%	kg	%	kg	%	kg	%	kg	%
January	370	0,7	29	0,3	–	–	514 760	3,0	–	–	–	–	514 760	2,8
February	5 041	9,1	328	3,8	13 652	6,6	2 570 020	15,0	–	–	42 708	9,7	2 626 380	14,7
March	9 906	17,9	1 754	20,2	10 484	5,1	1 687 088	9,8	–	–	90 654	20,7	1 788 226	10,0
April	14 697	26,6	2 798	32,2	75 180	36,4	1 395 939	8,1	91 045	100,0	159 667	36,4	1 721 831	9,6
May	7 460	13,4	1 533	17,6	45 609	22,1	2 857 199	16,7	–	–	68 913	15,7	2 971 721	16,6
June	14 050	25,4	1 904	21,9	42 916	20,8	2 699 769	15,8	–	–	43 421	9,9	2 786 106	15,6
July	2 535	4,6	248	2,9	18 532	9,0	2 656 021	15,5	–	–	20 403	4,7	2 694 956	15,1
August	858	1,6	92	1,1	–	–	1 064 962	6,2	–	–	12 543	2,9	1 077 505	6,0
September	283	0,5	–	–	–	–	1 029 936	6,0	–	–	–	–	1 029 936	5,8
October	89	0,2	–	–	–	–	434 055	2,5	–	–	–	–	434 055	2,4
November	–	–	–	–	–	–	122 393	0,7	–	–	–	–	122 393	0,7
December	–	–	–	–	–	–	102 791	0,6	–	–	–	–	102 791	0,6
Total (1991)	55 289	100,0	8 686	100,0	206 373	100,0	17 134 933	99,9	91 045	100,0	438 309	100,0	17 870 660	99,9
Percentage						1,2		95,9		0,5		2,5		100,1
Total (1990)	55 256		3 725		328 558		16 144 008		–		2 829 491		19 302 057	
Percentage						1,7		83,6		0,0		14,7		100,0

in 1974 to a record 68 500 t in 1983. Most of the catches during this period have, however, been between 15 000 t and 50 000 t.

The lanternfish catch, 662 t, was similar to the 1990 catch of 571 t. The catches of this species are also limited by availability rather than abundance, and the resource could sustain considerably higher catches than normally achieved, if the technology could be developed to exploit it efficiently and economically.

3.10.2 PRODUCTION

IN spite of the lower catch, the production of fish meal was similar to that in 1990 (Table XVI) and the yield factor accordingly improved from 4,3 to 4,2 t of fish needed to produce a ton of meal. Oil production more than doubled to 8 686 t, most likely as a result of good catches of the oily chub mackerel, particularly in April, and good yields from pilchard (Table XVI). The total for canned fish was some 1 400 t lower at 17 870 t, reflecting the poorer catches particularly of round herring but also of anchovy and horse mackerel, whereas more pilchard was canned from a lower catch. The catch of chub mackerel was under-utilized because of the short run and small size of the fish.

3.10.3 FISHING FLEET

THE pelagic fishing fleet, excluding bait boats, lost another vessel during the year and declined to 76 (Table XVII). The mean hold capacity also declined, to 123 t, compared with 127 t the previous year. If the bait boats are included, the total number of boats was 93, compared with 105 the previous year. As many of the bait boats are shorter than

18 m, the mean hold capacity of the total fleet was only 110 t.

Table XVII: Fleet size of the South-Western Cape pelagic fishery for factories, 1950–1991

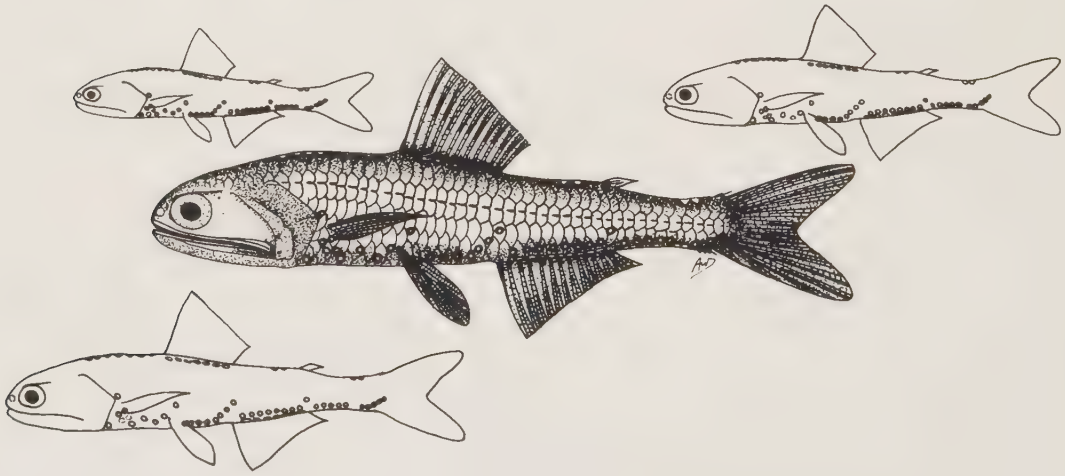
Period	Number of vessels	Fleet hold capacity (ton)	Mean vessel hold capacity (ton)
1950–1959*	202	7 000	35
1960–1969*	129	10 347	80
1970–1979*	109	12 130	112
1980–1989*	84	10 352	123
1989	79	10 439	132
1990	77	9 785	127
1991	76	9 375	123

* Mean annual values

3.11 Linefish

SINCE the freezing of the number of linefish vessels at the end of 1984, control over the fishery has been tightened. Linefishermen and boats are classified as recreational, semi-commercial (B) and commercial (A), and the only way to enter the fishery is to buy a vessel and its permit. In 1985 there were 410 craft with A-permits and 3 327 with B-permits which, after some re-allocation of categories and loss of permits because safety certificates had not been renewed, resulted in 450 A-permits and 2 880 B-permits being granted in 1988. The new Sea Fishery Act of 1988 that finally came into effect in 1990 allows permits to be transferred and sold so that a permit is not tied to a particular boat. The result has been that boat permits have been split or lumped together, affecting numbers. In 1990 there were 466 vessels with A-permits and 2 634 with B-permits and in 1991 there were 512 and 2 625 respectively (Table XVIII). The number of crew carried by these vessels has been fixed since the inception of the system and this has become the main means of controlling fishing effort, regardless of splits and lumpings. Fishing with handlines has always been the main fishery activity on the Cape south and east and Natal coasts and this is reflected in the distribution and rise of A-permits from 1990 to 1991 (Table XVIII).

The fishery is further limited by bag and size limits for various groups of species and by



The most commonly caught lanternfish, *Lampanyctodes hectoris*

Purse-seiners awaiting their turn to have fish pumped out in Sandy Point fishing harbour, St Helena Bay

closed seasons and areas. Since 1985 species have been grouped as Unrestricted (15 species), Protected (24 species) and Regulated (all those not classified under the previous two categories). There are no bag limits for the unrestricted category and only recreational anglers and spearfishermen are limited in the regulated category to 10 per person per day. Commercial fishermen are not limited in the protected category, but recreational and semi-commercial fishermen have a bag limit of five in total of those species. Recreational anglers and spearfishermen may further catch only a total of 10 fish from the regulated and protected lists. Galjoen may not be landed by semi- and commercial fishermen, and a bag limit of 20 squid applies to all. In addition, four of these species (and squid since 1988) have a closed season in part of spring and summer and 30 are subject to minimum size limits varying from 15 cm for strepie to 70 cm for garrick. By Amendment Notice R. 635 of 28 March 1991 in terms of the Act, two new species were subjected to minimum size limits, namely bronze bream and zebra, and the minimum sizes for 14 species were raised.

Various National Parks, Marine Reserves and Restricted Areas have been proclaimed along the coast, serving as effective closed areas for the commercial, semi-commercial and recreational linefisheries from boats, although surf and rock angling are permitted in most, albeit only in parts of them. Only in the small Miller's Point reserve in False Bay is fishing for snoek from a licensed fishing vessel permitted. The restricted area varies from 10 m seawards from the low-water mark in the Cape of Good Hope restricted area to 500 m or 1 nautical mile for most of the other smaller areas (2 miles in the case of the H. F. Verwoerd marine reserve)

Table XVIII: Permits issued to licensed South African commercial fishing vessels for commercial (A) and semi-commercial (B) line fishing and tuna (T) fishing (1 July to 30 June) as at 7 December 1992*

Registration area	Registration letters	Commercial (A)		Semi-commercial (B)		Tuna (T)	
		1990/91	1991/92	1990/91	1991/92	1990/91	1991/92
Walvis Bay	WB	–	1	–	–	1	1
Port Nolloth	PNA	1	1	31	34	2	1
Hondeklip Bay	HB	–	–	12	22	–	–
Vredendal District (including Doring Bay)	VR	–	–	122	121	–	–
Lambert's Bay	ADF	–	–	253	260	11	11
Piketberg District (including Elands Bay and Velddrif)	PQ	–	–	269	267	11	9
Saldanha Bay area	SBH	2	1	166	156	46	38
Vredenburg District (including Paternoster and St Helena Bay)	SH	1	1	233	217	45	44
Table Bay area (including Bok Bay and Yzerfontein)	CT	11	8	203	197	130	114
Cape Town Harbour	CTA	2	2	109	112	126	123
Hout Bay	HTB	19	20	74	82	104	110
Simonstown Harbour	STH	4	4	20	18	14	10
Simonstown area (including Cape Point and False Bay areas)	ST	13	14	248	234	132	124
Kalk Bay	KB	47	42	27	27	42	38
Somerset West District (including Gordon's Bay)	SW	16	15	172	165	72	64
Caledon and Hermanus Districts (including Hawston)	C	1	2	99	102	13	12
Gans Bay (including Klein Bay and Pearly Beach)	DDF	41	42	77	77	14	15
Bredasdorp District (including Waenhuiskrans and Struis Bay)	BR	64	67	99	99	43	43
Heidelberg District (including Witsand and Infanta)	SM	3	3	22	23	4	4
Riversdale District (including Still Bay and Puntjie)	R	11	14	90	93	7	9
Mossel Bay	MBA	8	9	37	35	32	32
George District	G	2	2	5	6	2	3
Knysna District (including Plettenberg Bay)	KN	7	8	20	22	13	16
Humansdorp District (including Jeffreys Bay and Oyster Bay)	H	47	64	92	97	106	111
Port Elizabeth area	PEA	35	39	49	50	66	66
Port Alfred District	P	23	27	47	53	20	23
East London area	ELA	9	8	19	17	9	9
Durban area	DNA	2	4	17	17	10	10
Natal coast	N	97	114	22	22	63	64
Total		466	512	2 634	2 625	1 138	1 104

* Includes both single and double permits; for example a boat with an A-permit may also have a T-permit and other permits

to 3 nautical miles for the larger reserves such as De Hoop, Tsitsikamma, St Lucia and Maputaland.

After the closure of the linefishery to new entrants at the end of 1984, a tuna linefishing permit was introduced (although a few permits for tuna purse-seining had been granted before). Tuna-fishing has remained the last open fishery, so that many who could not obtain B- or A-permits took out tuna permits, as well as many holders of such and other permits who laboured under the misapprehension that their permits did not entitle them to catch tuna. The number of tuna permits has been increasing steadily since the original 584 in 1985/86 to 893

Table XIX: Commercial Cape and Natal catches (t) of tuna species reported per catch method

Method	Albacore		Yellowfin		Bigeye		Skipjack		Total	
	1990	1991	1990	1991	1990	1991	1990	1991	1990	1991
Pole	4 169	2 669	614	18	296	85	16	15	5 095	2 787
Longline	–	–	–	–	–	–	1	–	1	–
Purse-seine	–	–	–	–	–	–	–	–	-	–
Rod and line	46	55	10	9	–	–	–	–	56	64
Trawl	–	–	–	–	–	-	1	–	1	–
Total	4 215	2 724	624	27	296	85	18	15	5 153	2 851

in 1989/90 and 1 138 and 1 104 in the past two seasons respectively (Table XVIII). However, of these vessels licensed all around the coast, some 30–40 larger ones carrying ice or equipped with freezers catch the bulk of the tuna off the West Coast, of which nearly all is exported from Cape Town and Hout Bay. Many of these vessels are also active in the pelagic and chokka fisheries, as is shown by the distribution of permits (Table XVIII).

There was a dramatic decrease of 45% in the tuna catch to only 2 850 t (Table XIX). This resulted from a decrease of 36% in the catch of albacore and the virtual disappearance of the yellowfin and bigeye tuna by-catch. Practically the entire catch was taken on poles off the Cape west coast, and the reduced by-catch meant that the contribution of albacore increased to 96% of the total for tuna.

There was a slight decrease in the number of commercial linefishing vessels reporting catches to the National Marine Linefish System. In total, 2 792 boats reported 93 170 days fished and a total catch of 13 570 t, excluding squid and tuna species. This is a slight decrease over 1990 (Tables XX and XXI), but late catch returns will probably raise this total to approximately the same as the previous year. Of this total, 12 663 t (Table XX) was caught in the Cape and 907 t (Table XXI) in Natal. The distribution of handline catches and effort (including squid) along the coast in 1991 is shown in Figure 3.

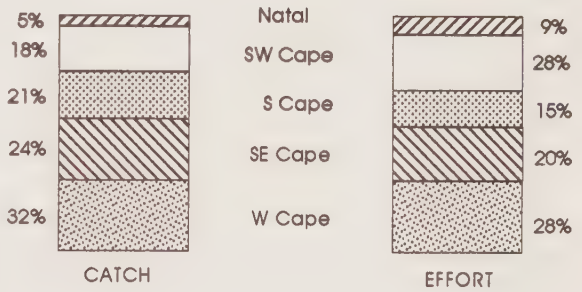


Fig. 3: Distribution of catches and effort around the coast in the handline fisheries for fish and squid

The decline in total catch resulted from lower catches of most of the main linefish target species (Table XX). The snoek catch of 6 322 t contributed half the total catch, and a decrease of 23% in the catch of this species was the main cause of the overall decline. Declines of 10–20% were also noted for yellowtail, kob, geelbek, carpenter, redfish species and hottentot.

In contrast to these declines, increases were observed for some species as a result of a number of interesting developments in the fishery. Large freezer vessels again directed increased effort to the red steenbras on the offshore Agulhas Bank, increasing the catch of this species by 30%. Unprecedented availability of chub mackerel off Plettenberg Bay led to

Table XX: Total reported Cape catch (to the nearest 100 kg) of

Locality	Snoek	Yellowtail	Kob	Geelbek	Carpenter (Silverfish)	Roman	Red steenbras	Red stumpnose	Dageraad
Port Nolloth	10 700	7 900	400	–	–	–	–	–	–
Doring Bay	13 100	23 400	300	–	–	–	–	–	–
Lambert's Bay	223 200	11 100	–	–	–	–	–	–	–
Elands Bay	144 200	–	100	–	–	–	–	–	–
Laaiplek	16 400	1 200	1 700	–	–	–	–	–	–
St Helena Bay	1 204 400	200	–	–	–	–	–	–	–
Saldanha Bay	67 000	200	2 900	300	100	–	–	–	–
Yzerfontein	723 600	8 600	–	100	–	–	–	–	–
Cape Town	247 600	–	200	400	100	–	–	–	–
Hout Bay	520 900	1 900	600	–	–	–	–	–	–
Kommetjie	1 247 500	9 200	4 400	400	300	1 500	–	–	–
Kalk Bay	604 500	9 100	52 600	5 000	1 300	8 000	–	–	–
Gordon's Bay	13 500	9 300	67 800	37 500	7 400	15 500	100	–	–
Hermanus	329 300	–	11 200	16 800	6 300	1 700	–	100	–
Gans Bay	351 700	33 300	64 200	99 000	116 700	23 600	2 300	1 700	–
Struis Bay	18 300	344 100	71 500	109 600	225 200	13 000	30 000	3 100	100
Waenhuiskrans (Arniston)	29 400	45 000	41 600	20 600	400 100	9 000	63 000	1 000	300
Still Bay	600	1 800	315 400	1 100	5 400	11 800	1 400	400	1 300
Mossel Bay	100	400	98 900	1 800	17 900	3 200	500	300	300
Plettenberg Bay	553 400	300	7 300	2 800	53 500	6 900	1 500	500	500
Jeffreys Bay	1 100	–	15 800	3 500	91 700	7 000	2 600	900	5 300
Port Elizabeth	100	5 800	45 200	6 500	100 100	4 500	1 500	1 900	6 800
Port Alfred	1 100	4 300	138 200	14 600	143 600	6 000	9 600	3 600	12 200
East London	–	–	11 800	17 500	33 700	100	12 800	500	4 000
Total (1991)	6 321 700	517 100	952 100	337 500	1 203 400	111 800	125 300	14 000	30 800
Total (1990)	8 186 500	565 200	1 216 500	379 700	1 224 100	128 200	95 300	18 700	34 800

* Mainly baardman, blue hottentot, butterfish, flathead, Fransmadam, gurnard, horse mackerel, jacopever, kingklip, knifejaw,
† Includes 13 566 kg of steentjie in 1991 and 24 004 kg in 1990 at Saldanha

Table XXI: Total reported catch (to the nearest 100 kg) of linefish species by

Locality	Kobs*	Geelbek	Slinger	Santer	Blueskin	Englishman	Scotsman	Emperor	Seventy-four
					1990				
Transkei	11 500	1 200	7 700	1 500	–	3 500	3 000	–	1 600
Southern Natal	45 500	118 800	138 800	26 200	9 900	45 200	13 400	1 700	6 100
Northern Natal	165 600	12 000	115 700	38 600	11 800	8 000	1 200	1 900	1 600
Total	222 600	132 000	262 200	66 300	21 700	56 700	17 600	3 600	9 300
					1991				
Transkei	1 800	100	3 400	600	–	700	700	–	100
Southern Natal	46 300	99 100	115 800	22 700	21 500	53 400	12 400	1 400	4 600
Northern Natal	104 900	7 300	125 500	42 700	15 100	4 700	700	4 700	800
Total	153 000	106 500	244 700	66 000	36 600	58 800	13 800	6 100	5 500

* Includes kob and squaretail kob
† Includes dageraad, Dane, king soldier and sand soldier
‡ Mainly seacatfish (barbel), German, grunter, kingfish, rubberlip, carpenter (silverfish), blue hottentot, dolphinfish and

linefish species by registered commercial boats in 1990 and 1991

Santer	Hottentot	Chub mackerel	Sharks	Panga	White stumpnose	Elf	Hake	Kingklip	Other*	Total
–	4 400	–	300	–	–	–	–	–	–	19 300
	21 100	1 800	2 900	–	–	–	–	–	31 900	77 800
–	11 400	–	100	–	–	–	–	–	2 000	257 500
	7 700		–	–	–	–	–	–	900	156 600
–	39 600	–	4 300	–	500	–	–	–	100	31 900
–	44 900	–	900	–	700	–	30 800	1 500	700	1 278 800
	72 200	500	27 700	–	59 000	900	4 500	100	14 800†	222 900
–	76 400	100	14 200	–	–	–	60 300	4 700	2 400	886 200
	15 900	–	9 800	–	700	100	–	–	500	335 800
–	87 300	–	500	–	–	–	122 300	8 500	33 000	703 600
–	27 200	100	75 600	1 200	1 900	–	66 900	12 600	73 600	1 582 500
–	28 300	400	1 200	13 200	41 800	13 200	100	–	6 300	783 900
	6 400	3 500	3 700	3 100	18 700	27 000	900	–	9 500	245 800
–	74 400	700	5 700	400	–	–	8 300	1 700	800	389 400
2 200	700	2 500	112 800	400	4 800	2 500	300	500	18 400	909 100
		5 700	21 400	200	100	7 300	24 400	5 100	25 200	907 200
11 500	–	1 100	23 000	200	–	100	1 900	–	1 800	649 600
3 500		100	23 000	600	–	1 600	21 300	–	1 900	391 200
1 300		11 200	23 900	400	–	300	142 100	200	2 100	304 900
700	–	108 500	6 400	4 800	400	6 900	556 800	54 700	4 200	1 370 100
1 000	–	23 100	2 300	27 700	–	800	95 000	–	2 800	280 600
4 100	–	1 500	3 600	22 800	–	800	117 000	1 000	4 200	327 400
5 200			1 500	87 000	–	–	7 400	–	4 900	439 200
500	–	200	600	21 200	–	–	200	–	8 500	111 600
30 000	517 900	161 000	365 400	183 200	128 600	61 500	1 260 500	90 600	250 500	12 662 900
31 700	541 000	30 500	186 800	171 600	268 800	47 700	347 400	–	319 900†	13 794 400

rock-cod, seacatfish (barbel), steentjie and wreckfish

registered commercial boats fishing off Transkei and Natal in 1990 and 1991

Red steenbras	Unspecified redfish†	King mackerel	Queen mackerel	Yellowtail	Poenskop (Black musselcracker)	Rock-cods	Other‡	Total
				1990				
15 900	600	400	–	500	2 500	3 700	8 100	61 700
1 100	500	31 800	1 400	900	8 200	37 000	45 500	536 500
100	500	25 700	2 300	–	2 100	34 200	19 200	446 300
17 100	1 600	57 900	3 700	1 400	12 800	74 900	72 700	1 044 500
				1991				
400	100	500		500	800	1 200	1 600	12 500
2 000	600	13 400	1 000	4 200	7 900	33 800	39 900	480 000
200	1 800	22 900	11 300	–	2 800	38 500	30 300	414 200
2 600	2 500	36 800	12 300	4 700	11 500	73 500	71 800	906 700

unspecified fish species

Table XXII: Total reported Cape landings (to the nearest 100 kg) of

Locality	Snoek	Yellowtail	Kob	Geelbek	Carpenter (Silverfish)	Roman, Red stumpnose, Santer	Red steenbras, Dageraad, 74
Port Nolloth	74 300	–	–	–	–	–	–
Doring Bay	10 700	–	–	–	–	–	–
Lambert's Bay	159 700	–	–	–	–	–	–
Elands Bay	13 100	–	–	–	–	–	–
Laaiplek	2 900	–	–	–	–	–	–
St Helena Bay	2 021 200	–	–	–	–	–	–
Saldanha	53 300	–	–	–	–	–	–
Yzerfontein	960 200	10 200	–	–	–	–	–
Kommetjie	98 700	–	–	–	–	–	–
Kalk Bay	639 900	3 000	22 400	1 800	–	4 500	–
Gordon's Bay†	–	600	500	1 600	2 000	1 300	–
Hermanus	122 600	6 200	2 000	1 200	189 800	300	10 100
Gans Bay	57 200	2 600	4 200	5 700	2 400	900	–
Waenhuiskrans (Arniston)	–	38 400	74 400	28 300	10 300	41 000	10 300
Still Bay	–	1 100	190 300	1 300	2 600	11 600	500
Total (1991)	4 213 800	62 100	292 800	39 900	207 100	59 600	20 900
Total (1990)	8 186 700	85 800	415 200	60 200	321 300	80 200	12 400

* Includes the same species as the Cape commercial catch summary
† Returns only for 5 months

Table XXIII: Total reported catch (to the nearest 100 kg) of linefish

Locality	Kobs*	Geelbek	Slinger	Santer	Leervis	Green jobfish	Unspecified redfish†
			1990¶				
Southern Natal	1 200	300	200	100	700	–	400
Northern Natal	12 800	–	4 600	600	500	3 400	800
Total	14 000	300	4 800	700	1 200	3 400	1 200
			1991				
Southern Natal	300	–	200	100	–	–	100
Northern Natal	3 300	–	1 200	400	200	2 600	1 000
Total	3 600	–	1 400	500	200	2 600	1 100

* Includes kob, mini-kob and squaretail kob
† Includes dageraad, Dane, false Englishman, seventy-four and unspecified redfish species
‡ Includes black marlin, blue marlin, striped marlin and sailfish
§ Includes eastern little tuna, skipjack, yellowfin tuna and unspecified tunas
‖ Mainly blueskin, brindle bass, elf, Englishman, kingfish, musselcracker, poenskop, prodigal son, queenfish, Scotsman,
¶ Figures for 1990 updated

a five-fold increase in catch, and False Bay produced good catches of elf because of increased targeting on this species.

Most notable, however, was the dramatic increase in the longline catch of hake. Hake longlines were introduced by vessels operating under newly issued shark- and tuna-longline

linefish species at fisheries harbours in 1990 and 1991

	Hottentot	Chub mackerel	Sharks	Panga	White stumpnose	Elf	Hake	Other*	Total
	–	–	–	–	–	–	–	–	74 300
	1 400	–	–	–	–	–	–	–	12 100
	24 400	–	–	–	–	–	–	–	184 100
	3 500	–	–	–	–	–	–	800	17 400
	1 000	–	–	–	–	–	–	–	3 900
	–	–	–	–	–	–	–	–	2 021 200
	3 200	–	1 600	–	–	–	–	500	58 600
	57 300	–	–	–	100	–	–	200	1 028 000
	26 600	–	–	–	–	–	–	1 100	126 400
	42 200	–	–	12 200	59 600	7 900	–	20 400	813 900
	1 800	–	–	–	1 500	2 200	–	100	11 600
	100	–	200	–	–	–	–	–	332 500
	5 100	–	3 400	–	–	100	–	–	81 600
	–	300	27 400	–	–	–	4 000	900	234 300
	–	100	18 100	200	–	1 000	12 000	500	239 300
	166 600	400	50 700	12 400	61 200	11 200	16 000	24 500	5 239 200
	186 300	–	30 100	3 300	5 500	3 300	22 900	5 700	9 418 900

species by recreational ski-boats in Natal in 1990 and 1991

	King mackerel	Queen mackerel	Rock-cods	Sharks	Dolphinfish	Billfish‡	Tunas§	Other‖	Total
					1990¶				
	4 100	700	800	800	100	–	2 400	1 700	13 500
	50 400	4 400	3 200	7 100	8 000	18 800	13 900	6 900	135 400
	54 500	5 100	4 000	7 900	8 100	18 800	16 300	8 600	148 900
					1991				
	400	100	500	100	–	–	400	600	2 800
	33 300	1 900	2 100	5 700	5 900	23 600	20 500	9 300	111 000
	33 700	2 000	2 600	5 800	5 900	23 600	20 900	9 900	113 800

snapper kob, stumpnose, wahoo and unspecified fish species

permits. They were deployed both in traditional hake linefishing areas on the South Coast and in competition with the demersal fishery on the West Coast. The reported catch of 1 261 t was four times that caught in 1990 (Table XX). However, catches were greatly under-reported, and the actual line catch of hake was probably more than double this figure. As a by-catch of the

Young red steenbras in the Agulhas Bank area

hake longline fishery, there was also a marked increase in the catch of kingklip, to more than 90 t, and a doubling in the catch of sharks.

Catches of most species off the East Coast also declined (Table XXI). Natal catches continued to be dominated by kobs, geelbek and slinger, but catches of all of them declined. The annual king-mackerel run was also smaller than in 1990. Although not main target species, increases of 70% in the blueskin and emperor catches and a threefold increase in the catch of queen mackerel helped offset these reductions.

Of the reported Cape linefish catch 41% was landed in 1991 at the fisheries harbours from Port Nolloth to Still Bay (Tables XX and XXII). Of this, 75% was landed at the three harbours of St Helena Bay, Yzerfontein and Kalk Bay during good snoek runs in their vicinity (Table XXII). In comparison with previous years, St Helena Bay was far more important than Yzerfontein as a landing site, despite increased landings of hottentot at Yzerfontein. Hermanus continued to be an important harbour for larger vessels discharging frozen catches of carpenter and red steenbras from the deep Agulhas Bank.

Little quantitative information is available on the sizeable recreational linefisheries and what there is emanates from Natal. During the period 1985–1989, catches varying between 150 and 214 t were reported by recreational ski-boat anglers from Natal. The catch in 1990 of 149 t was on par with that of 1985, but the 114 t in 1991 is the lowest on record (Table XXIII).

However, the level of reporting seems to have dropped, because 10 522 boat-days were reported on in 1991 in comparison with 11 509 in 1990. These anglers are particularly interested in gamefish, so that, although a wide variety is caught, tunas, billfishes, king mackerel and kobs feature prominently in their catches. In spite of the lower level of reporting, the rising trend in recent years for billfish and tuna species continued (Table XXIII), but whether the lower catches reported in 1991 for nearly all other species represent lower availability or diversion of effort to billfish and tuna species is uncertain. As always, king mackerel was the largest contributor to the catches of these ski-boats, but the reported catch was 38% down on 1990 (Table XXIII). The record catch of kobs in 1990 was not repeated and the 3 600 t was similar to the catch in 1989.

3.12 Mullet and St Joseph

THE number of permit-holders of beach-operated nets increased by two to 458 in 1991. Pursuant to a Ministerial decision in 1990, the total number of registered nets decreased by 1,3% to 960 in 1991 and will be reduced further (Table XXIV).

The southern mullet *Liza richardsonii*, the species most commonly caught off the West and South coasts

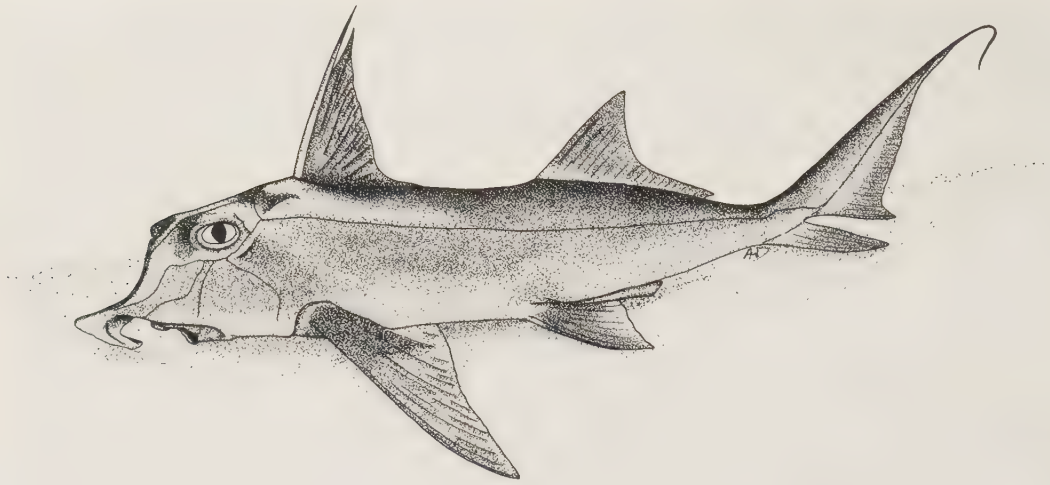
The total catch of mullet (harder) dropped by 25,5% to 4,4 million fish (about 1 089 t). Decreases were reported for most areas, ranging from 31 to 67%. Only in the areas Walvis Bay, Smitswinkel Bay to Palmiet River mouth and Mossel Bay to Buffels Bay were higher catches made,

Table XXIV: Geographical distribution of beach-operated net permits, permit holders and mullet catches (as at 31 December)

Region	Number of permit holders		Registered drift and beach-seine nets		Number of mullet caught		Percentage of beach-seine catch	
	1990	1991	1990	1991	1990	1991	1990	1991
Orange River to Lambert's Bay	33	35	41	43	161 547	69 582	2,8	1,6
Elands Bay to Langebaan	310	310	726*	714*	3 549 101	2 434 015	61,4	57,0
Yzerfontein to Kommetjie	28	28	34	34	447 197	285 069	7,7	6,7
Simonstown to Kleinmond	16	16	31	28	936 950	1 168 578	16,2	27,4
Kleinmond to Cape Agulhas	32	32	40	40	455 052	152 336	7,9	3,6
Cape Agulhas to Still Bay	29	29	35	35	194 907	100 816	3,3	2,4
Mossel Bay to Buffels Bay	2	2	3	3	38 783	57 444	0,7	1,3
Port Elizabeth	1	1	1	1	–	–	0,0	0,0
Subtotal (Areas 3–35)	451	453	911†	898†	5 783 537	4 267 840	100,0	100,0
Walvis Bay (Area 1)	5	5	5	5	59 744	86 664		
Total (numbers)	456	458	916†	903†	5 843 281	4 354 504		
Total (kg mass)					1 460 820	1 088 626		

* Does not include 10 large-meshed shark gillnets held by one permit holder in the area Stompneus Point to Little Paternoster

† Permits for drift nets allow holders to use either a small–meshed mullet drift net or a large-meshed St Joseph net with the same licence plate, thus theoretically doubling the 712 and 704 drift nets of those permit holders in 1990 and 1991 respectively; in fact only 45 large–meshed drift nets were in use in the area between Elands Bay and Langebaan in each year



The St Joseph *Callorhinchus capensis*

respectively 45, 25 and 48% up. Although the decrease in the most productive area, that between Elands Bay and Langebaan, amounted to 31% that area still contributed 57% of the total mullet catch (Table XXIV).

Table XXV: Species other than mullet caught in drift, beach-seine and shark gillnets

Species	Catch (kg)	
	1990	1991
St Joseph (Elephantfish)	183 403	282 420
Soupfin shark (Vaalhaai)	5 435	9 365
Skates and Rays	11 885	80
Unspecified sharks	20 579	2 521
Baardman	365	1 933
Elf	9 131	3 424
Kob	4 219	2 879
Horse mackerel	339	950
Pilchard (Sardine)	912	100
Seacatfish (Barbel)	402	857
Strepie	939	715
White steenbras	37 819	995
White stumpnose	2 932	29
Yellowtail	58 089	38 174
Other fish*	1 046	771
Squid	2	–
Total	337 497	345 213

* Blacktail (dassie), grunter, gurnard, hottentot, garrick (leervis), musselcracker, sand steenbras, sole, springer (flathead mullet), steentjie, zebra and unspecified bony fish

Despite a decline of 12% in total fishing effort, the by-catch rose by 2,2% to 345 t (Table XXV). St Joseph sharks and yellowtail again dominated the by-catch and contributed 82 and 11% to it respectively.

3.13 Demersal fish

IN 1991 the South African demersal fishery continued to diversify, thereby putting increasing pressure on demersal stocks. The demersal fishery is based on several different species and consists of a number of different fishing sectors. The Cape hakes remain the backbone of the demersal industry, but interest in other species has expanded. Of the stocks exploited, only the Cape hakes, Agulhas sole and horse mackerel are controlled by quotas. Although the different fishing sectors within the demersal fishery have their own preferred target species, there is often overlap and conflict of interest for the exploitation of one or more species, so introducing a multispecies/multifishery complexity that poses a difficult but challenging task for management.

3.13.1 DEEP-SEA TRAWL

AS in the past, the deep-sea trawl fishery formed the largest sector of the demersal fishery. Restrictions imposed on this fishery in 1991 were almost the same as in previous years. Vessels in the fishery have no limit to operating depth on the West Coast (west of 20°E), but are not allowed inside False Bay or within five nautical miles of the coast from Cape Point northwards. On the South Coast (from 20 to 27°E), deep-sea trawlers are not permitted to operate shallower than 110 m. On the West Coast, where catches of species other than hake are small, the minimum mesh size is 110 mm, but on the South Coast, where the fishery is more mixed, it was changed from the beginning of the year to 75 mm. The 1991 hake allocation for the deep-sea sector of the fishery was 117 634 t, some 85% of the Total Allowable Catch (*TAC*) set for hake. This allocation was divided among six quota holders, 80% going to the two largest operators. Some 107 trawlers were active (including nine midwater vessels) in deep-sea trawling. Of these, 89 were active "wet fish" boats and 18 freezer vessels. The fleet fished mostly deeper than 300 m, effort distribution being nearly the same as in previous years. Most fishing took place off Saldanha and Cape Town. Other areas fished regularly by the deep-sea fleet included the southern Agulhas Bank and south-west of Port Elizabeth.

3.13.2 INSHORE TRAWL

THE inshore and the deep-sea fleets are separated by the 110 m depth contour, and the inshore trawlers usually do not operate outside this contour. Prior to 1982, the inshore fishery was governed by overall quotas for Cape hake and Agulhas sole. At that time the fishery consisted of 23 companies operating 50 small side-trawlers with an average length of 23 m. The introduction of an individual quota system in 1982 was the first step towards rationalization to rid the fleet of excess effort. There are now 40 vessels remaining, of which on average 32 are active monthly. In 1991 the inshore fishery's share of the *TAC* for hake amounted to 9 834 t (7%), while the *TAC* for Agulhas sole was set at 872 t. The inshore fishery has maintained a reasonable degree of stability with consistent utilization of the annual hake and Agulhas sole allocations and of the by-catch species (Table XXVI).

3.13.3 MIDWATER TRAWL

THE introduction in 1990 of a midwater trawl fishery, which targets on horse mackerel, illustrated the complexity of setting a management strategy for an apparently bounteous resource, but which, because of the lack of sound information, is difficult to assess scientifically. A limited number of midwater trawl permits were issued for the directed catching of horse mackerel on the South Coast. Conditions of the permit restricted the use of the net to waters deeper than 110 m (as in the deep-sea trawl fishery) and to a net mesh of not less than 75 mm. Management of the horse-mackerel resource is complex because the niche occupied by the species places it in both demersal and pelagic domains. Horse mackerel are highly migratory and are caught by both bottom and midwater trawlers.

Of the horse-mackerel *TAC* of 45 000 t for 1991, 20 000 t went to the deep-sea sector, to be caught as either a directed catch or a by-catch. A further 18 000 t was allocated to midwater trawlers, while the rest was allocated to the inshore fishery.

Midwater trawling. Clockwise: Hoisting the cod-end on board; opening the cod-end on deck; some 15 t of horse mackerel on deck; and packing the fish for freezing

Table XXVI: Nominal (live) mass of bottom- and midwater-trawled fish, cephalopods and crustaceans landed in South Africa for South African quota-holders

Species	1990		1991			
			West Coast	South Coast	Total	
	tons	%	tons	tons	tons	%
Cape hakes	134 435	55,0	84 523	50 700	135 223	60,6
Kingklip	1 282	0,5	974	990	1 964	0,9
Soles	868	0,4	21	717	738	0,3
Kabeljou (Kob)	258	0,1	1	182	183	0,1
Panga	472	0,2	4	457	461	0,2
Other reds	100	0,0	8	84	92	0,0
Silverfish	20	0,0	1	14	15	0,0
Angelfish	958	0,4	716	57	773	0,3
Gurnards	3 601	1,5	272	361	633	0,3
Jacopevers	1 008	0,4	747	272	1 019	0,5
John Dory	885	0,4	507	388	895	0,4
Horse mackerel	43 875	17,9	3 808	31 207	35 015	15,7
Skates	1 398	0,6	31	1 237	1 268	0,6
White stumpnose	21	0,0	–	12	12	0,0
Snoek	13 091	5,4	7 725	7 882	15 607	7,0
Monk	5 405	2,2	4 637	1 247	5 884	2,6
Sharks and St Joseph	616	0,2	32	415	447	0,2
Chub mackerel	14 627	6,0	517	2 992	3 509	1,6
Ribbonfish	14 610	6,0	4 431	7 716	12 147	5,4
Red mullet	568	0,2	286	297	583	0,3
Red squid	53	0,0	60	18	78	0,0
White squid	606	0,2	40	423	463	0,2
Octopus	44	0,0	42	20	62	0,0
Pilchard	–	–	5	58	63	0,0
Other	725	0,3	453	274	727	0,3
		97,8				97,5
Subtotal	239 166	97,7	109 841	108 020	217 861	97,7
Offal (trash fish)	4 364	1,8			4 432	2,0
Subtotal	243 530	99,5			222 293	99,7
Natal†: Crustaceans	1 180	0,5			606	0,3
Cephalopods	100	0,0			28	0,0
Finfish	84	0,0			67	0,0
Total	244 894	100,0			222 994*	100,0

* Masses of 4 530 t of heads and 402 t of roes (mainly hake) were landed in 1991, but they form part of the live-mass value and have not been added in again

† The figures for Natal for 1991 only include catches made in Natal, whereas those for 1990 also include catches in Mozambique landed in Durban by South African companies

3.13.4 WEST COAST EXPERIMENTAL SOLE FISHERY

THE southern stock of West Coast sole is located between latitudes 27 and 33°S, although the most dense concentrations had historically been found between 28 and 30°S. The fishery for the southern stock had already been established on the inshore grounds off the Orange River in the 1930s, but catches declined in the late 1940s. There was a slight recovery in the mid-1960s (Fig. 4), but by 1974 the catch had declined to 41 t and remained negligible until 1990. In that year renewed interest in the fishery was shown when entrepreneurs surmised

Table XXVII: Trawling quota allocations per species and catches (in t) of foreign countries in the South African fishing zone

Country	Quota								Catch		By-catch*	
	Hake		Horse mackerel		Panga		Squid	Total				
	1990	1991	1990	1991	1990	1991	1990	1990	1991	1990	1990	1991
Israel	1 000	–	–	–	–	–	–	1 000	–	1 033	130	–
Japan	600	400	6 000	4 000	1 200	1 000	800	8 600	5 400	7 270	899	288
Portugal	1 000	1 500	–	–	–	–	–	1 000	1 500	1 002	104	65
Spain	1 000	1 000	–	–	–	–	–	1 000	1 000	984	46	47
Taiwan	1 350†	1 000	3 500	2 000	–	–	2 000	6 850	3 100	3 511	502	93
Trial runs	250	–	–	–	–	–	–	250	–	247	6	–
Subtotal	5 200	3 900	9 500	6 000	1 200	1 000	2 800	18 700	11 000	14 047	1 687	493
Mozambique	–	750	–	–	–	–	–	–	750			
Total	5 200	4 650	9 500	6 000	1 200	1 000	2 800	18 700	11 750			

* A by-catch of 15% is allowed
† Of this, 350 t is a permitted by-catch coupled to the quota for horse mackerel

that the stock was once again workable. This resulted in two "experimental" permits being issued in 1990 for the catching of sole. The catch in the first year yielded 60 t, but only 21 t were caught in 1991 (Fig. 4).

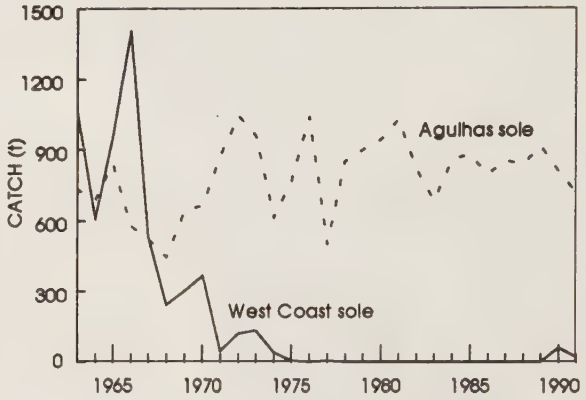


Fig. 4: Trends in the landings of West Coast and Agulhas sole, 1963–1991

3.13.5 WEST COAST EXPERIMENTAL GURNARD FISHERY

A SMALL demersal fishery targeting on gurnards in the St Helena Bay area on the West Coast was started in 1989. In 1990 two permits were issued. Catches are small and operators depend upon a significant by-catch that includes St Joseph and hake. It is known that the area cannot sustain a large catch of gurnard and that it is a recruiting area for juveniles of many fish species, including hake. The fishery is therefore restricted and permits have been limited to a maximum of three.

3.13.6 CATCHES BY FOREIGN COUNTRIES

FOREIGN vessels take a relatively small portion of the total demersal catch, as is evident from Table XXVII. It is also the Government's policy to gradually phase out foreign catches in the South African fishing zone, as is clear from the reduction of allocated quotas between 1990 and 1991. Overall, some three-quarters of the total allocation were caught in the past two years (Table XXVII),

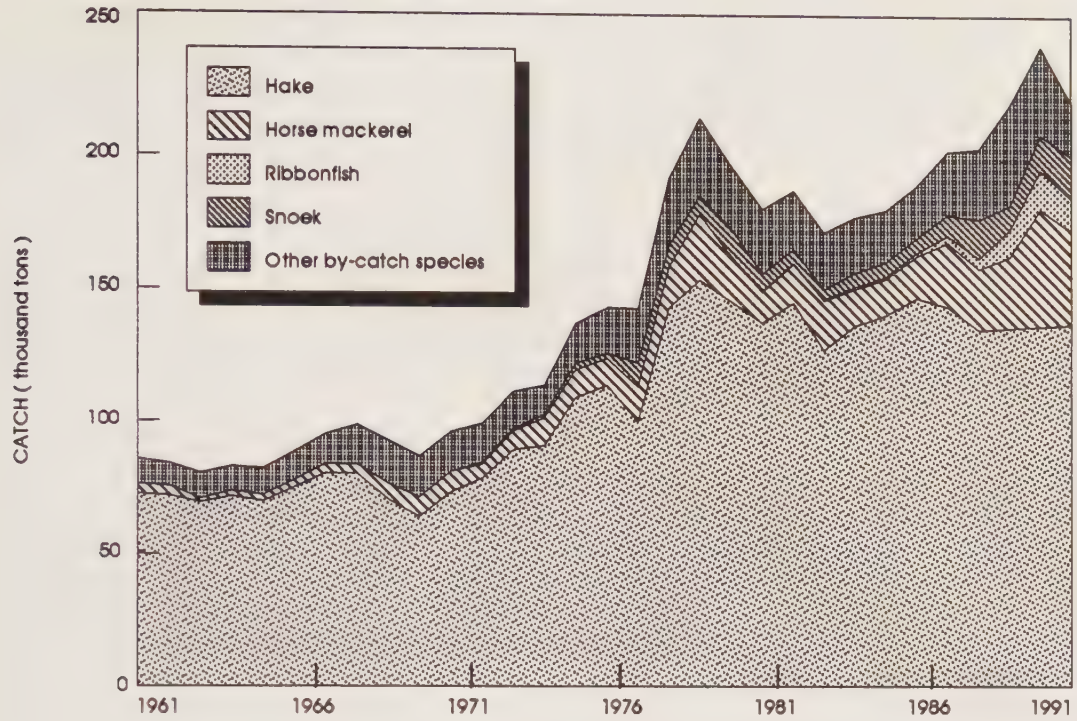


Fig. 5: Trends in the species composition of demersal landings, 1961–1991

but some national and species quotas were under-utilized to a greater extent.

In 1990 a quota of 250 t (trial runs in Table XXVII) was granted to one of the countries for the catching of hake in waters deeper than 500 m, a concession that was not repeated in 1991.

The 750 t of hake allocated to Mozambique in 1991 stems from the provisions of a joint venture.

3.13.7 DEMERSAL SPECIES AND STOCKS

TRENDS in the overall South African demersal catch and for important constituent species are presented in Figure 5. Total demersal landings amounted to 223 000 t in 1991, which is similar to the 1989 figure but 8% lower than in 1990 (see Table XXVI). The proportion of hake is declining, although the overall hake *TAC* for 1991 was increased by 4 500 t to 139 500 t. Cape hakes constituted 61% of the demersal landings in 1991 and this illustrates that they are still the dominant catch of the demersal fleet even though other species are targeted. Catch rates of hake on the West Coast improved marginally in 1991 and there was an overall increase in hake-directed effort in this area. There is an imbalance in the hake catches by the deep-sea fishery on the West and the South Coast because scientific assessment has shown that the resource should be fished in the approximate proportion 2:1 (West Coast:South Coast). Although catches are not always in the recommended ratio (see Table XXVI), the industry has made considerable progress towards attaining this goal.

Table XXVIII: Nominal catches (t) of kingklip by bottom longline (1983–1990) and by trawl (1932–1991)

Period	West Coast		South Coast		Total	
	Trawl	Longline	Trawl	Longline	Trawl	Longline
1932 – 1944*	492	–	123	–	615	
1945 – 1965*	1 300	–	557	–	1 857	
1966 – 1982*	2 349	–	1 518	–	3 867	
1983	1 984	842	1 433	200	3 417	1 042
1984	2 160	1 881	1 433	1 159	3 593	3 040
1985	1 400	1 314	2 000	5 656	3 400	6 970
1986	1 684	1 231	954	7 453	2 638	8 684
1987	1 677	1 948	799	4 504	2 476	6 452
1988	1 418	2 091	744	3 311	2 162	5 402
1989	1 134	1 648	484	2 266	1 618	3 914
1990	747	557	535	708	1 282	1 265
1991	974	–	990	–	1 964	–

* Mean annual catches

The good availability of the main demersal species experienced by the inshore sector during 1989 and 1990 dropped off towards the end of 1990 and this trend continued into 1991. Shallow-water hake did not move onto the inshore trawling grounds as they traditionally do. The size composition of hake landed by the inshore sector remained consistent with previous years.

Assessment of the hake resource, based on the 1991 hake-directed catch data, showed the continued recovery of the stock. However, of major concern was the catching of an unknown quantity of hake by handline and longline fishermen on the Cape south and south-western coasts. Interest in longlining continues and its potential effects for hake and the interaction with other hake-directed fisheries are being investigated.

Agulhas sole has been fished commercially since 1892. Landings reached 700 t by 1920 and thereafter fluctuated between 500 and 1 000 t (see Fig. 4). Catches in 1991 were poor, the fishermen were unable to fill their quotas and only 717 t of the slightly higher *TAC* of 872 t was caught. Catch rates dropped and there was a noticeable scarcity of large sole.

Catches of horse mackerel are split between three sectors of the demersal fishery (deep-sea, midwater and inshore) and include some foreign catch. The 35 015 t landed constitutes the largest proportion of the demersal landings (16%) other than hake, although it represents a drop of 20% from last year (Table XXVI).

Since the cessation of demersal longlining at the end of 1990, there has been some evidence of improvement in the deep-sea trawl catches of kingklip, although catch levels are still below those attained before the advent of longlining in 1983 (Table XXVIII). It is hoped that, in the absence of longlining and with no kingklip-directed trawling, the natural resilience of this long-lived species will permit the stock to recover gradually.

Demersal species other than hake are becoming increasingly valuable. Catches of snoek and monk increased in 1991 (see Table XXVI) and this evidence, together with information from sources in the deep-sea industry, clearly indicates targeting on these species. Snoek has become important in demersal trawling, with catches more than double those taken by

the traditional handline fishermen. On the other hand, the 3 500 t of chub mackerel caught was only a quarter of the 1990 catch (see Table XXVI).

Targeting on sharks is also likely to increase in future. With the development of a directed longline shark fishery, markets should improve. Because of the vulnerability of sharks to over-exploitation, future shark-directed effort will have to be closely controlled.

3.14 Seals

THERE was no seal harvest in 1991 as a result of a Ministerial decision in 1990 not to permit any more sealing for at least two years. This followed a recommendation by the Hanks Subcommittee of Enquiry into Scientific Aspects of Sealing that sealing should be suspended until more scientific research could be done into certain aspects of seal harvesting.

3.15 Guano

SEABIRD guano was removed from two South African localities in the past two years: Bird Rock Platform (Walvis Bay) and Bird Island (Lambert's Bay). Quantities were similar at Lambert's Bay, but the yield was better in 1991 at Bird Rock Platform (Table XXIX). Islands under South African jurisdiction for which concessions existed for the removal of guano, but from which no guano was shipped, were Mercury Island, Ichaboe Island, Seal and Penguin islands near Lüderitz and Bird Island in Algoa Bay.

In Namibia 2 826 t of guano was collected from seabird platforms — 380 t at those in the northern part of Cape Cross Lagoon, 1 091 t at those near the mouth of this lagoon and 1 355 t at those just north of Swakopmund. The production in southern Africa therefore amounted to 3 346 t. This compares with 3 497 t in 1990, 4 447 t in 1989 and 2 791 t in 1988.

Table XXIX: Guano scraped at South African seabird colonies

Colony	Production (t)	
	1990	1991
Lambert's Bay Island	75	80
Robben Island	3	–
Subtotal	78	80
Bird Rock Platform (Walvis Bay)	355	440
Total	433	520

3.16 Historical reviews of exploitation control

THE series of internal reports on the historical development of the various sectors of the fishing industry and other related events started in 1989 was extended this year. In addition to the seven reports produced last year, the following were completed in Afrikaans:

- 'n Oorsig van die Suidkuskreefbedryf (South Coast rock lobster)
- 'n Sinopsis van die Suid-Afrikaanse seewierbedryf (Seaweed)
- Suid-Afrika se strandtrekseën-, dryf- en St Josefhaai-netbedryf (Beach nets)
- Die oesterbedryf in Suid-Afrika (Oysters)
- Die ontwikkeling van die perlemoenbedryf, 1950–1991 (Abalone)
- Aspekte van die evolusie van die Weskuskreefbedryf sedert die herreëling van 1983 (West Coast rock lobster).

* * *